

Michael B. Paulsen
Editor

Higher Education: Handbook of Theory and Research

Volume 28

 Springer

Higher Education: Handbook of Theory and Research

Volume XXVIII

Associate Editors

John M. Braxton, Ph.D., Department of Leadership, Policy, and Organization, Payne Hall, Peabody #514, 230 Appleton Place, Vanderbilt University, Nashville, TN 37203-5721, USA, john.m.braxton@vanderbilt.edu
(College Faculty)

Laura W. Perna, Ph.D., Graduate School of Education, University of Pennsylvania, 3700 Walnut Street, Philadelphia, PA 19104, USA, lperna@gse.upenn.edu
(Policy)

Scott L. Thomas, Ph.D., School of Educational Studies, Claremont Graduate University, 150 E. Tenth Street, Claremont, CA 91711, USA, scott.thomas@cgu.edu
(College Students)

Michael N. Bastedo, Ph.D., Center for Higher and Postsecondary Education, School of Education, 2108C SEB, The University of Michigan, Ann Arbor, MI 48109-1259, USA, bastedo@umich.edu
(Organization and Administration)

Linda Serra Hagedorn, Ph.D., Department of Educational Leadership Studies, Iowa State University, N243 Lagomarcino Hall, Ames, IA 50011, USA, lindah@iastate.edu
(Community Colleges)

Stephen L. DesJardins, Ph.D., School of Education, #2108D SEB, 610 E. University Avenue, The University of Michigan, Ann Arbor, MI 48109-1259, USA, sdesj@umich.edu
(Research Methodology)

Raymond D. Perry, Ph.D., Department of Psychology, 404 Duff Roblin Building, The University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2, rperry@cc.umanitoba.ca
(Curriculum and Instruction)

Robert K. Toutkoushian, Ph.D., Institute of Higher Education, Meigs Hall, Room 114, University of Georgia, Athens, GA 30602, USA, rtoutkou@uga.edu
(Finance and Economics)

Linda Eisenmann, Ph.D., Office of the Provost, Wheaton College, 26 E. Main Street, Norton, MA 02766, USA, eisenmann_linda@wheatoncollege.edu
(History and Philosophy)

Sylvia Hurtado, Ph.D., Higher Education Research Institute, 3005 Moore Hall, Box 951521, University of California, Los Angeles, CA 90095 USA, shurtado@gseis.ucla.edu
(Diversity Issues)

For further volumes:
<http://www.springer.com/series/6028>

Michael B. Paulsen

Editor

Higher Education: Handbook of Theory and Research

Published under the Sponsorship of the
Association for Institutional Research (AIR)
and the Association for the Study of Higher
Education (ASHE)

Volume 28



Springer

Editor

Michael B. Paulsen
Department of Educational Policy
and Leadership Studies
N491 Lindquist Center
The University of Iowa
Iowa City, IA 52242, USA

ISSN 0882-4126

ISBN 978-94-007-5835-3

ISBN 978-94-007-5836-0 (eBook)

DOI 10.1007/978-94-007-5836-0

Springer Dordrecht Heidelberg New York London

Library of Congress Control Number: 2013930232

© Springer Science+Business Media Dordrecht 2013

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed. Exempted from this legal reservation are brief excerpts in connection with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher's location, in its current version, and permission for use must always be obtained from Springer. Permissions for use may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution under the respective Copyright Law.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Contents

1	You Don't Have to Be the Smartest Person in the Room	1
	George D. Kuh	
2	Student Engagement: Bridging Research and Practice to Improve the Quality of Undergraduate Education	47
	Alexander C. McCormick, Jillian Kinzie, and Robert M. Gonyea	
3	From When and Where I Enter: Theoretical and Empirical Considerations of Minority Students' Transition to College.....	93
	Deborah Faye Carter, Angela Mosi Locks, and Rachelle Winkle-Wagner	
4	Social Networks Research in Higher Education	151
	Susan Biancani and Daniel A. McFarland	
5	Research Integrity and Misconduct in the Academic Profession	217
	Melissa S. Anderson, Marta A. Shaw, Nicholas H. Steneck, Erin Konkle, and Takehito Kamata	
6	Instrumental Variables: Conceptual Issues and an Application Considering High School Course Taking.....	263
	Rob M. Bielby, Emily House, Allyson Flaster, and Stephen L. DesJardins	
7	On the Meaning of Markets in Higher Education	323
	William E. Becker and Robert K. Toutkoushian	
8	Learning Strategies, Study Skills, and Self-Regulated Learning in Postsecondary Education	377
	Philip H. Winne	
9	The History and Historiography of Teacher Preparation in the United States: A Synthesis, Analysis, and Potential Contributions to Higher Education History.....	405
	Christine A. Ogren	

10 A Review and Critique of the Literature on Community College Students' Transition Processes and Outcomes in Four-Year Institutions	459
Peter Riley Bahr, Christie Toth, Kathryn Thirolf, and Johanna C. Massé	
11 Public Policy and Higher Education Attainment in a Twenty-First-Century Racial Demography: Examining Research from Early Childhood to the Labor Market	513
Stella M. Flores and Leticia Oseguera	
12 Advancing the Study of Student-Faculty Interaction: A Focus on Diverse Students and Faculty	561
Darnell Cole and Kimberly A. Griffin	
13 State Support of Higher Education: Data, Measures, Findings, and Directions for Future Research	613
David A. Tandberg and Casey Griffith	
Name Index	687
Subject Index	713
Contents of Previous Volumes	729

Contributors

Melissa S. Anderson Department of Organizational Leadership, Policy, and Development, University of Minnesota, Minneapolis, MN, USA

Peter Riley Bahr Center for the Study of Higher and Postsecondary Education, School of Education, University of Michigan, Ann Arbor, MI, USA

William E. Becker Department of Economics, Indiana University, Bloomington, IN, USA

Susan Biancani School of Education, Stanford University, Stanford, CA, USA

Rob M. Bielby Center for the Study of Higher and Postsecondary Education, School of Education, University of Michigan, Ann Arbor, MI, USA

Deborah Faye Carter School of Educational Studies, Claremont Graduate University, Claremont, CA, USA

Darnell Cole Rossier School of Education, University of Southern California, Los Angeles, CA, USA

Stephen L. DesJardins Center for the Study of Higher and Postsecondary Education, School of Education, University of Michigan, Ann Arbor, MI, USA

Allyson Flaster Center for the Study of Higher and Postsecondary Education, School of Education, University of Michigan, Ann Arbor, MI, USA

Stella M. Flores Vanderbilt University, Nashville, TN, USA

Robert M. Gonyea Center for Postsecondary Research, Indiana University, Bloomington, IN, USA

Kimberly A. Griffin Education Leadership, Higher Education, and International Education, University of Maryland College of Education, University of Maryland, College Park, MD, USA

Casey Griffith Higher Education, Educational Leadership and Policy Studies, Florida State University, Tallahassee, FL, USA

Emily House Center for the Study of Higher and Postsecondary Education, School of Education, University of Michigan, Ann Arbor, MI, USA

Takehito Kamata Department of Organizational Leadership, Policy, and Development, University of Minnesota, Minneapolis, MN, USA

Jillian Kinzie Center for Postsecondary Research, Indiana University, Bloomington, IN, USA

Erin Konkle Department of Organizational Leadership, Policy, and Development, University of Minnesota, Minneapolis, MN, USA

George D. Kuh Center for Postsecondary Research, Indiana University Bloomington, Bloomington, IN, USA

Angela M. Locks Student Development in Higher Education, College of Education, California State University, Long Beach, CA, USA

Johanna C. Massé Center for the Study of Higher and Postsecondary Education and the Department of Sociology, University of Michigan, Ann Arbor, MI, USA

Alexander C. McCormick Center for Postsecondary Research, Indiana University, Bloomington, IN, USA

Daniel A. McFarland School of Education, Stanford University, Stanford, CA, USA

Christine A. Ogren Educational Policy and Leadership Studies, University of Iowa, Iowa City, IA, USA

Leticia Oseguera Department of Education Policy Studies and The Center for the Study of Higher Education, The Pennsylvania State University, University Park, PA, USA

Marta A. Shaw MICHR Research Ethics and Integrity Program, University of Michigan, Ann Arbor, MI, USA

Nicholas H. Steneck Department of Organizational Leadership, Policy, and Development, University of Minnesota, Minneapolis, MN, USA

David A. Tandberg Higher Education, Educational Leadership and Policy Studies, Florida State University, Tallahassee, FL, USA

Kathryn Thirolf Center for the Study of Higher and Postsecondary Education, University of Michigan, Ann Arbor, MI, USA

Christie Toth Joint Program in English and Education, University of Michigan, Ann Arbor, MI, USA

Robert K. Toutkoushian Institute of Higher Education, University of Georgia, Athens, GA, USA

Rachelle Winkle-Wagner Educational Leadership and Policy Analysis, University of Wisconsin, Madison, WI, USA

Philip H. Winne Faculty of Education, Simon Fraser University, Burnaby, BC, Canada

About the Authors

Melissa S. Anderson, Ph.D., is a professor of Higher Education and an affiliate faculty member in bioethics at the University of Minnesota. Professor Anderson's work over the past 25 years has been in the areas of research integrity, responsible conduct of research, and academy-industry relations. Her research, funded by the US National Institutes of Health and the National Science Foundation, has focused on the research environment in relation to research integrity. Professor Anderson recently served as principal investigator of an NIH-funded study of integrity in international research collaborations, and she coedited (with Nick Steneck) the volume *International Research Collaborations: Much to be Gained, Many Ways to Get in Trouble* (Routledge Press).

Peter Riley Bahr is an assistant professor in the Center for the Study of Higher and Postsecondary Education at the University of Michigan, where he serves as the faculty advisor of the Community College Interdisciplinary Research Forum. In addition, he is a research associate with the Michigan Center for Student Success, housed at the Michigan Community College Association, and an investigator in the IES-funded Center for Analysis of Postsecondary Education and Employment. His research focuses on the highly varied pathways that students take into, through, and out of community colleges. His recent work seeks to deconstruct students' course-taking and enrollment patterns in community colleges in order to illuminate the relationships between students' pathways and their eventual outcomes.

William E. Becker is professor emeritus of economics, Indiana University Bloomington, and an adjunct professor of commerce, University of South Australia. He is also a research fellow, Institute for the Study of Labor (IZA, Bonn, Germany), and a fellow, Center for Economic Studies and Institute for Economic Research (CESifo, Munich Germany). He was editor of the *Journal of Economic Education* from 1989 to 2009, when he also served on the editorial board of the *Economics of Education Review*. He was 2005–2006 president of the Midwest Economic Association and for over 20 years served on the American Economic Association Committee on Economic Education.

Susan Biancani (biancani@stanford.edu) is a Ph.D. candidate in organization studies at Stanford University School of Education. She holds an M.A. in sociology from Stanford and is completing an M.S. in computer science with focus in artificial intelligence from Stanford. Her work uses methods from social network analysis and from linguistics to study the flow of ideas through networks, the development of consensus and contestation, and the role of organizational units, such as departments and research centers, in scholarly collaboration.

Rob M. Bielby is a Ph.D. student in the Center for the Study of Higher and Postsecondary Education, School of Education, at the University of Michigan. He has an M.A. in political science from the State University of New York at Stony Brook and an M.A. in higher education from the University of Michigan. His research interests are the study of quantitative methods, quasi-experimental designs, and public policy in higher education.

Deborah Faye Carter is an associate professor in the School of Educational Studies at Claremont Graduate University. She earned her Ph.D. at the University of Michigan in higher education. Her main areas of scholarly interest are educational aspirations, persistence, transition to college, and students' experiences in undergraduate research activities. Her research interests focus on access and equity in higher education—particularly as they relate to race and socioeconomic status. Her teaching includes courses on access and equality in higher education.

Dr. Darnell Cole is an Associate Professor of Education at the University of Southern California (USC), with an emphasis in higher education and education psychology. He completed his undergraduate work at the University of North Carolina, Charlotte, and received his M.A. and Ph.D. degrees at Indiana University, Bloomington. His areas of research include race/ethnicity, diversity, college student experiences, and learning. He has published over 25 articles and book chapters, and his work is featured in *Journal of College Student Development*, *Journal of Creative Behavior*, *Journal of Higher Education*, *NASPA Journal*, and *Review of Higher Education*.

Stephen L. DesJardins is a professor in the Center for the Study of Higher and Postsecondary Education, School of Education, at the University of Michigan. His teaching and research interests include postsecondary education policy, strategic enrollment management issues, research methodology, and the economics of higher education. His work in these areas has been published in higher education and economics journals and in previous volumes of *Higher Education: Handbook of Theory and Research*.

Allyson Flaster is a Ph.D. student in the Center for the Study of Higher and Postsecondary Education at the University of Michigan. She earned an EdM in higher education administration from Harvard University and is a former TRIO program staff member. Her research interests are the causes and consequences of postsecondary inequality and the effects of financial aid on student outcomes.

Dr. Stella M. Flores is Assistant Professor of Public Policy and Higher Education and Assistant Professor of Sociology at Vanderbilt University. Her work employs large-scale databases and quantitative methods to investigate the impact of state and federal policies on college access and completion for low-income and under-represented populations. Her publications appear in peer-reviewed journals such as *Educational Evaluation and Policy Analysis*, the *Review of Higher Education*, the *American Journal of Education*, and the *Future of Children*. She holds an Ed.D. in Administration, Planning, and Social Policy with a concentration in Higher Education from Harvard University.

Robert M. Gonyea is associate director of the Indiana University Center for Postsecondary Research where he coordinates research and analysis for the National Survey of Student Engagement and associated projects. Since 1999 he has been an integral contributor to NSSE's development and success, such as the continuous improvement and testing of survey questions, design of reports and tools for institutional assessment, and the creation of the Beginning College Survey of Student Engagement (BCSSE) to assess precollege preparation and engagement. Gonyea holds an Ed.D. in higher education and student affairs from Indiana University.

Dr. Kimberly A. Griffin is an Associate Professor of Education at the University of Maryland, College Park, with a focus on student affairs and higher education. She received her doctorate from UCLA, master's from the University of Maryland, College Park, and a B.A. from Stanford University. Her research is organized around three topics: diversity within the Black community, access and equity for underserved communities, and mentoring and developmental relationships in higher education. Her work appears in *the American Educational Research Journal*, *Journal of College Student Development*, *Review of Higher Education*, and *Journal of Negro Education*.

Casey Griffith is a doctoral student in education leadership and policy studies. His main areas of interest are P-20 state policy and standardized testing. He is a former high school teacher. Casey received a Bachelor's in political science and a Master's in education social sciences both from the University of Florida.

Emily House is a Ph.D. student in Educational Studies program in the School of Education at the University of Michigan. She earned an MPP in educational policy from the Peabody College of Education and Human Development at Vanderbilt University and is a former high school teacher. Her research interests include postsecondary readiness, access, and affordability, as well as issues related to postsecondary mismatch.

Takehito Kamata, Ph.D. student in Higher Education, is a Graduate Research Assistant in the Department of Organizational Leadership, Policy, and Development at the University of Minnesota. His research interests are in the areas of higher education responsibility, research issues and policy, higher education policy, cooperative education, and university ranking systems at the national and global levels. He is a board member of the Truman and Reta Wood Community Leadership Scholarship at Minnesota State University, Mankato. Takehito Kamata is from Japan.

Jillian Kinzie is associate director of the Indiana University Center for Postsecondary Research where she conducts research and directs activities on effective use of student engagement data to improve educational quality. She also serves as research associate for the National Institute for Learning Outcomes Assessment (NILOA). She earned her Ph.D. from Indiana University in higher education with a minor in women's studies. At IU, she coordinated the master's program in higher education and student affairs. Previously, she served as an administrator in academic and student affairs. She is coauthor of *Student Success in College: Creating Conditions that Matter* (Jossey-Bass, 2005/2010).

Erin Konkle is a doctoral student at the University of Minnesota in Organizational Leadership, Policy, and Development where she works as a Graduate Research Assistant. Previously she served as Administrative Director of the Office for Optimizing Educational Experiences at the University of South Carolina. Erin's research interests are in the areas of positive psychology in education, higher education organizational development, and elementary-to-college education models.

George D. Kuh is Chancellor's Professor of Higher Education Emeritus at Indiana University Bloomington and Adjunct Professor of Education Policy at the University of Illinois at Urbana-Champaign. Born in Chicago, Illinois, in 1946, he currently directs the National Institute for Learning Outcomes Assessment (NILOA). Founding director of the widely used National Survey of Student Engagement (NSSE), George has written extensively about student engagement, assessment, institutional improvement, and college and university cultures and has consulted with more than 350 colleges and universities in the USA and abroad. George earned his B.A. at Luther College, M.S. at the St. Cloud State University, and Ph.D. at the University of Iowa.

Angela Mosi Locks is an assistant professor of student development in higher education at the College of Education at California State University Long Beach. She earned her doctorate in higher education from the University of Michigan. Dr. Locks explores institutional diversity praxis and the recruitment, retention, and experiences of students of color in colleges and universities, including college access programs and undergraduate research. Her current projects include a longitudinal examination of Latina/o middle-school students' college-going attitudes and aspirations through the first year of college and first-generation community college students' transition to college and transfer experiences.

Alexander C. McCormick is associate professor of educational leadership and policy studies at Indiana University Bloomington, where he teaches in the Higher Education and Student Affairs program and directs the National Survey of Student Engagement. His work focuses on higher education quality, improvement, and accountability. Previously, he was a senior scholar at The Carnegie Foundation for the Advancement of Teaching, where he led a major update of the Carnegie Classification of Institutions of Higher Education. He was also senior research associate at MPR Associates held administrative posts at Dartmouth College. He holds a Ph.D. in education from Stanford University.

Daniel A. McFarland (mcfarland@stanford.edu) is associate professor of education at Stanford University, specializing in social dynamics. McFarland teaches graduate-level courses in social networks, social theory, organizations, and knowledge creation. He is currently engaged in several projects concerning the coevolution of social networks and cultural systems. He is also an associate professor of sociology and organizational behavior (by courtesy).

Christine A. Ogren is associate professor in the Department of Educational Policy and Leadership Studies at The University of Iowa. A historian of both K-12 and higher education, her work has focused on gender, social class, teacher preparation, and the teaching profession. She is author of *The American State Normal School: "An Instrument of Great Good"* (Palgrave Macmillan, 2005) and articles in *History of Education Quarterly*, *The Journal of Higher Education*, and *Women's Studies Quarterly*. She has served as secretary of Division F (History) of the American Educational Research Association and on the History of Education Society's Board of Directors.

Dr. Leticia Oseguera is an Assistant Professor in the Department of Education Policy Studies and a Research Associate at the Center for the Study of Higher Education at the Pennsylvania State University. Her research focuses on college access and transitions of underserved populations. She is currently Principal Investigator a University of California All Campus Consortium on Research for Diversity (UC/ACCORD) grant examining low-income students' pathways to college and the labor force. Dr. Oseguera's research has been published in *Youth and Society*, *Research in Higher Education*, *Review of Higher Education*, *Journal of College Student Retention*, and *Journal of Hispanic Higher Education*.

Marta A. Shaw is the Global Corruption Report Fellow with Transparency International and a Ph.D. Candidate in Organizational Leadership, Policy, and Development at the University of Minnesota. Her research is focused on the impact of globalization on higher education governance, research integrity, and intercultural education. She has served as a research assistant on an NIH-funded study of international research collaborations. Her recent projects have examined university governance reform in Poland, the impact of the Bologna Process on faculty in Ukraine, and intercultural competence development in US higher education.

Nicholas H. Steneck is a Professor Emeritus of History and Director of MICH Research Ethics Program at the University of Michigan. His work on research integrity began in 1984, when he chaired Michigan's pioneering Task Force on Integrity in Scholarship (1984). From 1991 to 1993, he chaired the Public Health Service Advisory Committee on Research Integrity. Professor Steneck helped establish the ORI/NIH Research on Research Integrity Program, cochaired six ORI Research Integrity Conferences (2000, 2002, 2004, 2006, 2008, and 2009) and co-organized and cochaired the First and Second World Conferences on Research Integrity (Portugal 2007, Singapore, 2010). He was instrumental in the development of the *Singapore Statement on Research Integrity* and is currently the lead advisor for a new international online research integrity training program developed by the UK company, Epigeum.

Dr. David A. Tandberg is currently an assistant professor of higher education at Florida State University. His teaching and research interests center on state higher education policy and politics, including the political antecedents of state higher education policy and finance decisions. Previously, Dr. Tandberg served as a special assistant to the secretary of education in the Pennsylvania Department of Education. His dissertation on the politics of state higher education funding won dissertation of the year for 2006–2007 from the Politics of Education Association.

Kathryn Thirolf is a doctoral candidate in the Center for the Study of Higher and Postsecondary Education at the University of Michigan. Her studies have focused on the organizational behavior and management of colleges and universities, particularly community colleges. Her dissertation investigates the multiple identities of community college faculty. In addition to working part-time at Washtenaw Community College, she is a steering committee member of the Community College Interdisciplinary Research Forum.

Christie Toth is a doctoral candidate in the Joint Program in English and Education at the University of Michigan, a graduate student research assistant at the Sweetland Center for Writing, and a steering committee member of the Community College Interdisciplinary Research Forum. She has taught English composition in both community college and 2-year tribal college settings. Her research focuses on writing placement at open-access institutions, composition pedagogy at community and tribal colleges, the professional identities of 2-year college English faculty, and the writing experiences of community college students, both before and after transfer.

Robert K. Toutkoushian is professor of higher education at the Institute of Higher Education, University of Georgia. He conducts research on the application of economic principles, theories, and methods to a wide range of issues in higher education. He is currently the editor of *Research in Higher Education* and an associate editor for *Higher Education: Handbook of Theory and Research*.

Rachelle Winkle-Wagner is an assistant professor of educational leadership and policy analysis at the University of Wisconsin, Madison. She earned her Ph.D. at Indiana University in education policy studies with a concentration in higher education and minors in sociology and inquiry. Her work focuses on the sociological aspects of race, class, and gender in higher education. She uses a P-20 (primary school through graduate school) perspective to research the access and success of underrepresented students. Her current research projects focus on issues such as college success for African American female students, access to graduate school for students of color, and diversity policies. Previously, Dr. Winkle-Wagner was at the University of Nebraska and lecturer at the University of Pennsylvania.

Philip H. Winne (Ph.D., Stanford University) is Professor and Canada Research Chair in Self-Regulated Learning and Educational Technologies at Simon Fraser University. He researches how learners build knowledge and regulate learning and designs software to gather and analyze data about these processes. A Fellow of the American Educational Research Association, American Psychological Association,

Association for Psychological Science, and Canadian Psychological Association, he was presented the Robbie Case Memorial Award for outstanding contributions to educational psychology in Canada. He served as President of the Canadian Educational Researchers Association, the Canadian Association for Educational Psychology, and Division 15–Educational Psychology of the American Psychological Association.

Chapter 1

You Don't Have to Be the Smartest Person in the Room

George D. Kuh

Writing this autobiographical essay reminded me at times about how I felt when preparing the personal statements for my promotion and tenure dossiers. Those personal statements as well as this essay include some self-aggrandizing. Both also depend on a bit of retrospective sensemaking. The essay, covering a much longer time frame, may not be as accurate as I'd like, as my memory is less and less reliable as the distance grows between events and recollections. These caveats aside, it's an unexpected privilege to be invited to revisit and share many of the major events in my professorial career and especially to recall the people who influenced my thinking and work over a 45-year career in higher education.

I've tried to tell my story in a lucid, engaging manner. At the same time, it has been impossible to reflect on the influences of specific people or projects without taking occasional side trips that introduce other topics that at least in my mind are connected. For those, dear reader, I beg your indulgence.

As my story makes evident, I'm an ordinary person who has had more than his share of extraordinary opportunities. Since completing the Ph.D. at the University of Iowa in 1975, the focus and methodological approaches of my work have evolved, in large part because of circumstances that introduced me to bright, interesting, and productive people. In the early years of my academic career, however, I was occasionally troubled with a less flattering interpretation: that my research and writing lacked coherence in terms of their animating questions and cumulative contributions to the field. I was advised when applying for early promotion to associate professor that my personal statement should explain how my various projects and papers and those planned added up to something somewhat greater than the sum of their parts. My explanation worked, apparently, and I successfully repeated the drill to earn tenure and later promotion to professor. I hope this effort does not disappoint.

G.D. Kuh, Ph.D. (✉)

Center for Postsecondary Research, Indiana University Bloomington,
1900 East Tenth Street Eigenmann Hall Suite 419, Bloomington, IN 47406-7512, USA
e-mail: kuh@indiana.edu

So, how is it that a regular fellow from the south side of Chicago—the first in his family to go to college—found his way into academe and made a good life and living there?

Growing Up

One of the few unequivocal conclusions from the research on college impact and student success is that those to whom one is born is a nontrivial factor when it comes to preparing for, getting into, and finishing college. My parents expressed unconditional love for me at every stage of my life, even when I did things that surely gave them pause (a huge understatement). My juvenile transgressions aside, it was made plain to me and my younger brother that we would do something neither Mom nor Dad did—go to college.

My mother, Anne, graduated from high school second in her class, someone once told me, but never considered college, which was the case with most women in the 1930s. My father, Rudy, left school after 7th grade to work with my grandfather (also named Rudy) in a fledgling construction business that soon failed. A card-carrying teamster, he drove a truck the rest of his working days. Our family lived out the promise of the American dream—children of immigrant parents making enough money to compile a nest egg large enough to leave the upstairs flat in the Chicago house owned by my maternal grandparents for a brand new house of their own in a nearby suburb. Moving to Oak Lawn in the middle of my 7th grade year resulted in, among other things, no longer having to share a bedroom with Warren. I am not sure which one of us appreciated this change more.

The move from the city was followed by a surprise 18 months later when it was time to go to high school. Because of existing school district lines, instead of going to lily-white Oak Lawn High School, about one mile away, I attended Blue Island Eisenhower, which was quite large (4,800 students total, 800+ in my 1964 graduating class) and much more racially, ethnically, and socioeconomically diverse. I don't now recall the school's exact profile, but a reasonable guess is that at least one-quarter was African American with another much smaller percentage Latino. Attending this high school was a profoundly formative experience that shaped and anchored my social attitudes and worldview and that continues to define who I am today.

I almost always looked forward to going to school, except on days when a math or Latin test was scheduled. Even through college, more important to me than the academics was connecting with peers, primarily through out-of-class activities, especially sports. If there was a ball involved—big or small, round or oblong—I was there. In high school, I participated in interscholastic athletics every season: 2 years of football, as freshman and senior; 2 years of cross-country (OK, no ball involved), as sophomore and junior; 4 years of basketball; and 4 years of baseball. These after-school activities kept me (mostly) out of trouble, made all the other aspects of schooling worthwhile, and taught me valuable lessons about how to work effectively

with and rely on people who on the surface looked very different from me but fundamentally were very much the same. As it turns out, athletics was as important as any other factor in determining where I went to college.

Undergraduate Days

I've devoted my entire career to thinking, studying, and writing about college life, especially undergraduate education. For this reason, devoting a chunk of this essay to my college years is more than a trivial indulgence. It is a window into who I am, what I've done, and why I remain energized about trying to enhance the impact and quality of the collegiate experience for others.

In May of my high school senior year, I was all set to go to Northern Illinois University. Several high school pals were headed there as well. But fate intervened in the form of one of my favorite high school teachers and coaches, Richard Weiner. A graduate of Luther College, Mr. Weiner arranged to drive me there to visit the campus, in Decorah, Iowa, during which time I would meet the basketball coach. We left Oak Lawn at 4:30 A.M. and returned early the next day, probably about 1:30 A.M., covering the 600+ round-trip miles during that 20-hour period. I had spent time on a handful of college campuses for various reasons during high school, including two other Lutheran colleges, St. Olaf and Wartburg. In fact, the brother of the pastor of my home church was the president of Wartburg College.

The visit to Luther was replete with a series of almost magical moments unlike any I had experienced prior. I immediately fell in love with the campus, and the love affair continues. Whatever was in my mind about the perfect place for a college, this small, idyllic Phi Beta Kappa jewel nestled in the spectacularly rugged corner of northeast Iowa was it. That day, I did not know how much Luther cost (\$1,750 annual comprehensive fee guaranteed for 4 years) or even if I was admissible. Nor was I put off by the brief, 10-min meeting with the aging basketball coach, Hamlet Peterson (a *Sports Illustrated* Hall of Fame coach, as I learned later). After a few minutes, he turned to Mr. Weiner and said, "He's not very big, is he?" So much for high-pressure, high-profile recruiting! I completed the application for admission that same afternoon.

My parents were thrilled with my decision for Luther, as it was for them perhaps the last best hope that I would become a minister. That option had crossed my mind occasionally in my youth, but it had no place in choosing Luther. My goal was to become a high school teacher and coach—two of the few college-educated role models with which I had firsthand experience. I learned later, reading a chapter in Nevitt Sanford's classic, *The American College*, that pursuing such an occupation was a sociologically predictable choice for those first in their families to go to college. At least this was true in the 1950s and 1960s.

I played basketball at Luther all 4 years, which included a trip to the NCAA small college regionals in my sophomore year (only two divisions then, big and small). In my senior year, I was the team's most improved player, which gives you

some idea, perhaps, about how well I had played previously! While basketball was important to my identity and sense of belonging to the college, I also connected to the institution and peers in numerous other ways, which almost certainly made a positive difference in my obtaining a degree on time. Indeed, I do not recall a single moment of doubt that I would graduate.

Fully integrated into the college's social systems, as explained in the Tinto (1987) model, in addition to playing basketball, I was an orientation assistant, wrote a column for the student newspaper (being for much of my junior year the Headless Norseman, the supposedly anonymous author of a column that spoofed campus events and occasionally lampooned faculty, staff, and students), and was active in a fraternity (Luther forbade national organizations and formally referred to these groups as "brotherhoods" [for men] and "societies" [for women]). I was later president of my fraternity, which afforded multiple opportunities to meet with the dean of students about various matters and included a few occasions when he bestowed accolades on our accomplishments and contributions to the quality of campus life. As president, I also got to drive the fraternity's 1929 fire truck in Luther's homecoming parade and for other celebratory events.

I was an obedient, almost always serious, but not brilliant student. All of my grades were C or better. I took a full load every semester and never dropped a class. But as with many traditional-age undergraduates then and now, I was not cognitively and intellectually developed enough to take full advantage of the rich intellectual and cultural resources offered by the college, faculty, and many of my peers. I could have been the poster child for Nevitt Sanford's astute observation about it being unfortunate that college seniors were about to leave the institution because it was not until then that most were at the cusp of being able to synthesize, integrate, and reconstruct what they had learned from their studies and other experiences and to use these abilities and knowledge to successfully deal with challenging issues and novel situations.

I graduated on time, in May 1968, with majors in English and history and a secondary school teaching certificate, having completed my student teaching that spring in nearby Cresco, Iowa. Fortunately, Luther College was not done with me yet.

Getting into the Higher Education Business

The job market for high school teachers in the late 1960s was robust. In fact, about 10 min into my first interview with a Wisconsin school district recruiter, I was offered a contract. Flummoxed, I almost accepted on the spot. But I was also about to interview for an admissions position at Luther, which was attractive for multiple reasons, not the least of which was the princely annual salary of \$6,200 and unlimited use of a college-owned car! That job prospect soon came through, and overnight I went from being an undergraduate to a full-time member of Luther's admission staff.

My 4 years in admissions work at Luther was significant for several reasons. First, I was introduced to the world of higher education (at least a slice of it) from the

perspective of staff member, which stimulated an unquenchable thirst for learning more about college students and how colleges work. In addition, as much as any other event or experience, the job turned me into a college junkie. During those years and since, when traveling for work or family vacations, it was a given that a route close to a college or university would include a brief self-guided driving tour of the campus.

A second reason the admissions work was important to my career is that I met people working for other colleges and universities representing a variety of missions, histories, and cultures. In retrospect, I see this as having been an informative tutorial about the widely acknowledged strength of American higher education: institutional diversity.

Third, and perhaps most important, I learned how to effectively handle substantial autonomy. That is, the nature of my work as structured by Luther at the time left me to determine pretty much on my own how to use the workday. Luther's staffing pattern then was to assign its admissions personnel to different states and regions. In my first year, I was based in Illinois, my home state. The one-bedroom apartment near Chicago that I shared with my wife, Kristi, and later my infant daughter, Kari, was also my office, from which I scheduled high school visits, made follow-up phone calls, and managed correspondence. The next 2 years, when my territory included Minnesota and the Dakotas (fertile Lutheran ground!), we lived in a two-bedroom apartment in Anoka, a Twin Cities suburb northwest of Minneapolis, just 10 miles from where Kristi was raised and where her parents still taught in the local schools. I handled this independence better than a couple of my colleagues in admissions did. On balance, the work was very good preparation for a research university professorship, which offers almost complete autonomy.

In my final year working for Luther, I was assistant director of admissions, which required moving back to Decorah. I had completed a master's degree the prior summer, and life was good. But it was during this time that recruiting a new class every year began to feel more like a grind than a service to the college. The work was then and is now essential, one of Victor Baldridge's (1981) "jugular-vein" functions of an institution of higher education.

Some behavioral patterns persist from my years in admissions, one of which is checking the mail every day! The Monday through Saturday snail mail brought enrollment deposit checks, which we tabulated daily. Ritualistically, I hovered over the mail with my colleagues on days we were in the office to see if we were on pace with the current year's target.

So, all told, I spent eight formative years at Luther College—the first four as a student and a second four working in admissions. Now, 40 years later, I'm back at Luther again, serving on its board of regents and chairing its Student Learning and Campus Life Committee. When the invitation was extended to join the board, I consulted with some trusted advisors. One of them, John Gardner (the fellow who has almost single-handedly made the first-year experience a legitimate focus of college and university work), had served in a similar capacity at his alma mater. He said I would find the service both rewarding and informative, and he was exactly right. Working with such deeply committed and exceptional people has been a blessing. While, for sure, there are plenty of debates about important and meaningful issues,

never once in any setting have I seen a flash of ego from any regent. On the whole, it is a rare but beautiful thing to see highly accomplished people all committed to finding the best way to do the right thing.

Chance Encounters Lead to Graduate Study

My undergraduate academic record was not one over which graduate school admissions committees would drool. In fact, going on for further study never entered my mind until a chance encounter in the fall of 1967 with my senior paper adviser, Professor John Bale. After a question about my progress, he asked me if I was thinking about the GRE. I didn't know what this was and wondered if he had maybe meant to say "GTO"—a General Motors muscle car of that era! And then he asked where was I going to do my MAT—yet another unfamiliar acronym.

Up until that October afternoon, I had not heard of either the Graduate Record Examination or the Master of Arts in Teaching, which was a relatively new program designed for people who intended to teach in high school or, perhaps, at a community college. Moreover, I did not think of myself as someone who even ought to entertain such matters. For me, the son of a truck driver with a 7th grade education, a baccalaureate degree seemed enough of a reach. Obviously, I was wrong. But it took someone to point that out to me, to tap me on the shoulder and say, "Look at this—you can do it!"

In May 1994, Luther conferred on me an honorary degree. As faculty and staff gathered in the robing room prior to the commencement procession, I recounted to Professor Bale the memorable, life-altering exchange during which he suggested I go to graduate school. I asked expectantly, "Do you recall it?" Of course, he didn't. It struck me a few moments later that he must have had such conversations with scores if not hundreds of students, raising their aspirations. I realized something that commencement day, reflecting on a moment many years earlier. A teacher's words—even those we think to be insignificant, whether after class, in the margins of a paper or in an email—*what* we say and *how we say it* can have a profound impact. Our words can open up previously unconsidered options, putting students on a trajectory of achievement that makes it possible to become more than they dared to dream. But words can also dampen one's prospects. So it's always, *always* better to err toward the former as Professor Bale did with me.

A Walk-On at St. Cloud State

One of the perks of the Luther admissions job was tuition reimbursement for graduate study. The college encouraged all exempt employees (as I recall it) to work toward an advanced degree. Given that today the enrollment management business is a 24/7, demanding, continuous cycle, it's hard to conceive that one could devote the

summer months for two or more consecutive years to graduate study, but back then it was doable.

I applied first to the educational psychology master's program at the University of Minnesota, but I was not found worthy. Undaunted, I stood in a long line on a very warm day in June 1969 to register for classes at St. Cloud State College (now University). I completed the master's degree in school counseling (the program that was closest to my interests) in three summers with a couple of evening courses during spring quarters.

The master's program was important because it showed me (better said, I showed myself) that I could perform academically on a par with the best of my peers. I was interested in the course work (most of it, anyway) and found some of it applicable to my work, which I now know is a key factor in mastery learning. Of the many wonderful memories from that time, two stand out because they were instrumental in my seriously considering doctoral study.

The first was taking a class in the summer of 1970 from a visiting instructor, Dr. John Doerr, at that time a faculty member at the University of Missouri at Kansas City (UMKC). Besides looking familiar, Doerr pronounced my last name correctly when calling the roll the first class meeting. The reason for that was he had been a counselor at my high school, although I had not known him in that capacity. Doerr was a self-described gym rat, and he knew me because of athletics. I did well in his class, and he urged me to go on for a doctorate. Two years later, I spent a couple of days in Kansas City as his guest, interviewing for the doctoral program. Even though I chose Iowa, I stayed in touch with Doerr, who subsequently became executive vice chancellor at UMKC before retiring.

My second noteworthy experience during the master's program at St. Cloud was the three-quarter sequence of courses that culminated in a "problem paper," or so it was called, a project that for all practical purposes was akin to a master's thesis. The goal was to learn how to conduct a research project—which we did by doing one! The first quarter was devoted to identifying the problem to be examined and anchoring it in a literature review. The second quarter's work was fleshing out the methods and collecting the data. And the final quarter was devoted to analyzing the data and writing up the results. I did not have access to computer-assisted programs at that time, so I cranked out percentages using a large hand-operated calculating machine. Submitting the paper for publication, the last step, was presumably to give us experience with the publication process; we were not required to have it published, only to try.

Well, my first publication (not counting my Headless Norseman columns) was based on my master's degree problem paper (Kuh, Redding, & Lesar, 1972). I vividly recall returning to Decorah from an admissions trip late one Friday night in the spring of 1972 and stopping in the office to go through the mail (as always). In the stack was an envelope from the *Journal of the National Association of College Admissions Counselors*. I was so excited that in my haste I cut the letter in thirds with the letter opener! The farthest thing from my mind that evening was that this would be the first of several hundred publications that would bear my name.

Doctoral Study at Iowa

I went to the University of Iowa in the fall of 1972 with the career goal of becoming a therapist (really!) in a college or university counseling center, an aspiration my lifelong friends and family members still chuckle at when it comes up in conversation. I was motivated at the time to do work for individual betterment. The admissions job had such a dimension, of course, but my interests at the time focused on people, not institutions. It wasn't long before the counselor education (major) and higher education (minor) course work began to inform and complicate my understandings of the nature of the relationships between people and institutions, bringing me to realize that trying to separate them in theory and practice was not likely to be in the long-term interest of fostering personal growth or organizational effectiveness.

Iowa did not in those years have a student development track in counselor education, but there were several foundational courses that addressed relevant topics. One such course was "The College Student," taught by Albert Hood; its main text was Nevitt Sanford's (1962) *The American College*, some chapters of which lay the groundwork for later investigations into the developmental process common to traditional-age college students, such as those by William Perry, Lawrence Kohlberg, and others.

My nascent interest in writing and research deepened, in large part, in the opportunities Iowa afforded and those I had a hand in creating. I took a course on personality theories from Diane Carter, who offered (very) pointed, critical feedback on my early papers. She pleaded that I find a peer to review my work so I could revise it before turning it in to her. I did so, gaining a valuable lesson and behavior that continues to have positive return on investment.

William Packwood, a young faculty member with a University of Minnesota Ph.D., was my program advisor. He taught the introduction to student personnel services course, which included a great deal of reading, along with about 20 one-page tightly focused papers (more than one a week), to which he provided a voluminous amount of feedback, both substantive and stylistic. The class that semester threatened to revolt, and no one produced all 20 of these papers; I think I led the pack with 13 or so. We could rewrite the papers to improve both our grade and the quality of the product, an approach I adopted when I started teaching graduate classes. In conversations with Bill, he told me he was drawing on some of these one-page papers to help outline material and build a comprehensive reference list for a handbook about student personnel services he was editing. The nasty one-page issue paper assignment turned out to be another stepping stone to publication for me (and several of my peers), as Bill invited me to author the chapter on admissions (Kuh, 1977a) and to coauthor the orientation chapter with Michael Dannells (Dannells & Kuh, 1977), who retired a few years ago as professor and chair of the Bowling Green State University higher education doctoral program.

In addition to these early entries to the literature, I also published on work I conducted as part of graduate assistantships; one publication was from the College of

Education's Placement Office (Kuh, 1975), and another was from the year I taught courses in interpersonal communications skills and personnel management in the Iowa College of Dentistry (Kuh & Soule, 1975). These seemingly random publications prompted Elaine El-Khawas to offer the following when presenting me with the Association for the Study of Higher Education Research Achievement Award in 2000:

For those of you just starting out as higher education scholars, I hope that George will not mind if I tell you that, as we all do, George started out modestly. His first grants, during his first years as an academic, were about \$5,000 in size... It was not until 10 years later that he obtained his first sizeable grant. So too, his first publications were modest, including work published in the *Journal of Educational Staffing* and in the *American Dental Assistant Association Journal*. The important thing is where he went from there.

Another formative experience was working with Al Hood as his graduate assistant for the *Journal of College Student Personnel*, for which Hood was the editor. This allowed me to see firsthand what happens to a paper from the time it is submitted to when it appears in print, almost always at least a year later. This was a most revealing experience, as I learned that even well-published people with exceptional national reputations sometimes submit less-than-stellar work and have to revise (sometimes multiple times) their paper before it can be accepted.

In those years, the University of Iowa College of Education was one of several schools (the University of Minnesota and the University of Maryland were two others) characterized as favoring “dust-bowl empiricism”—using inductive quantitative approaches to investigate educational phenomena and discover “truth.” The practical significance for me at the time was a very challenging series of required statistics courses. The Iowa educational psychology faculty had developed the well-regarded Iowa Test of Basic Skills; nearby, in Iowa City, was the American College Testing (ACT) program. This meant there was considerable expertise to staff these courses and serve on dissertation committees. In fact, two statisticians served on my committee: H.D. Hoover and Bill Snider.

Snider's primary role was to certify my computer skills, which was a popular alternative to demonstrating the required language skill. At the time, packaged statistics programs such as SPSS or SAS were not readily available, which meant we had to be facile enough to write our own computer programs to analyze the data typically coded on punch cards or tapes. The output was printed on large sheets of green paper. By the mid-1980s, punch cards had pretty much disappeared, as did the over-sized green computer print-out paper a few years later.

My dissertation was a longitudinal study of whether the changes in attitudes and values manifested during college persisted in the years following college. The study was prompted by my having read an interview with Theodore Newcomb (Tavris, 1974) in which he pointed out that little was known about what happens to college graduates after they finish their studies. In that era, research into the personality orientations of college students received a fair amount of attention, with much of the work employing nationally normed instruments. One of the more popular tools was the Omnibus Personality Inventory (OPI). Some of the best work in this arena in the 1960s was based at the Center for the Study of Higher Education at the University of California at Berkeley (Clark, Heist, McConnell, Trow, & Yonge, 1972). I recalled

completing the OPI twice as a Luther student, once as a freshman just before classes started and again in my senior year.

After an exhaustive search of basements and attics on the Luther campus, I was unable to locate these OPI data or any of the other matched years for freshman and seniors that completed the OPI. This led me to contact Paul Heist, one of the OPI authors and a coinvestigator on the Berkeley studies. I then learned, happily, that Heist was a Luther graduate and friend of Clair Kloster, a longtime Luther faculty member and administrator who advocated on my behalf to Heist. After some weeks of uncertainty, Heist confirmed having found the longitudinal data for the Luther class of 1969 (a year after mine) in a locked file cabinet in a warehouse in Oakland, California. In those days, to protect the data from being destroyed or otherwise compromised, data sets were kept in multiple secure locations. Heist told me he had to break the lock on the file cabinet, as no one could find the key! I was in business and spent almost all of 8 months of my waking hours on the dissertation, which included administering the OPI to the Luther College class of 1969 5 years later, in 1974. This research resulted in three of my early publications, two in the *Journal of College Student Personnel* (Kuh, 1976, 1977b) and another in the Luther alumni magazine.

I've occasionally pondered whether there is wisdom in reviving and updating tools such as the OPI. Most of the personality-oriented measures used prior to the appearance of the OPI were based on populations judged to be abnormal by the mores of the times, such as the Minnesota Multiphasic Personality Inventory, considered the gold standard for measuring psychopathology in adults. The OPI, however, was normed on college student populations. It was first and foremost a research tool, unlike some of the later personality measures, such as the Myers-Briggs Indicator, which are used for other purposes. Today, with much attention paid to narrow, standardized measures of student learning outcomes such as critical thinking and analytical reasoning, it would be refreshing and instructive to focus some assessment work on other aspects of student development that are equally important to living a fulfilling life and sustaining a democratic society.

The values and attitudes of traditional-age undergraduates are influenced more by their peers than by their teachers and other resources (Astin, 1977, 1993; Pascarella & Terenzini, 2005). This truism is also one of the arguments for doctoral program residency requirements. Thanks to my spouse, who had a half-time teaching job, I had the good fortune—the luxury, some would say—of devoting 34 months to my doctoral study at Iowa along with the 20-hour-a-week commitment to assistantships or other work. The first 24 months were concentrated on course work and the remaining portion on the dissertation. Most other doctoral students in my program also were full time in that they had few if any major competing responsibilities and obligations other than family. Although the Iowa program was not designed to be a cohort experience as we think of the approach today, because most of us were taking the same classes, the impact was similar as we spent a lot of time together both inside and outside of class. As a result, we got to know one another well, trusted one another, and worked closely together on class projects and professional development activities, including conference presentations and occasional publications. The faculty set high performance expectations, and

students reinforced the same with one another. In addition to Mike Dannells, mentioned earlier, Carney Strange, also a longtime faculty member at Bowling Green State University, was in my cohort.

By far, the most significant event of my doctoral study years was the birth of my son, Kristian, in September 1974. The cramped two-bedroom, one-bathroom apartment that was vintage graduate student housing now seemed even smaller. This new, wonderful member of our family was another incentive (not that I needed one) to complete my dissertation.

A Faculty Career...by Default

As my interest in becoming a college counselor waned, I began to explore other alternatives. The most appropriate prospect it seemed, given my prior experience, was to obtain an administrative position in student affairs. I applied for several such jobs in the spring of 1975, in anticipation of defending my dissertation that summer. However, my lofty aspirations were not commensurate with the level of experience and credentials demanded by the positions for which I was applying. In other words, I was simply not qualified for them.

One job I lobbied hard for and believe I could have done well was that of student services officer for the University of Minnesota General College. The General College was established in 1932 as an experiment in general education, and over the years it became a gateway for underprepared metro-area high school students, many of whom were immigrants and people of color. The more I learned about the General College and its mission, the more attractive I found the job. I made it through the early rounds of screening, interviewed in the conference hotel for the annual American Association for Higher Education (AAHE) meeting in Chicago, and later even went to the University of Minnesota Twin Cities campus on my own dime to learn more about the General College and to express my keen interest in the position. But it was not to be. The offer went to David W. Williams, who has since held senior leadership positions at several colleges and universities, including Temple University, Fort Valley State University, Metropolitan State College of Denver, Central Michigan University, and the University of Connecticut. Over the years, I've seen David at professional conferences, and we recount how our lives and careers would have been different—not necessarily better—had I been offered the General College job.

Just as the Minnesota door closed, another opened. Bill Packwood, my advisor and dissertation director, announced he was taking a leave of absence to return to his home state of Louisiana to do some education and public policy work out of the governor's office. I was one of two candidates to interview for what was billed as a 1-year appointment to cover Bill's courses. Ironically, the other candidate was a recent graduate of the Indiana University program I joined a year later.

The year teaching at Iowa was most satisfying and a terrific way to find out if the professoriate was a good fit. My assignment was divided between teaching two courses

a term and serving as the assistant director of a federally funded drug counseling program. Because I had taken at Iowa all but one of the courses I taught, the existing syllabi needed only modest revisions—but then I had to figure out how to make the material relevant and interesting, both to the students and myself. I also developed and taught one new course, a doctoral seminar on student development theory, which has since become a staple offering in higher education and student affairs graduate programs. Most of the dozen or so students in that seminar were also peers and friends, including Dary Erwin, who went on to direct the institutional research and assessment office at James Madison University and to help establish the country's first Ph.D. program in assessment there, as well as the aforementioned Mike Dannells and Carney Strange. I often tell people when Carney and I are together that I taught him everything he knows about student development! Of course, that is not so.

As it turned out, Bill Packwood stayed in Louisiana for several more years, never returning to the University of Iowa. He later joined the faculty at Moorhead State University in Minnesota, where he taught for many years. I likely could have stayed at Iowa for at least another year, but assuming Bill was returning, I was active on the job market. Two positions were of keen interest to me: tenure-line faculty appointments at Indiana University and Purdue University. In some ways, the Purdue position was a better fit, as its student personnel program was housed in the counselor education division, which had an intellectual orientation similar to that of my Iowa doctoral program. But there were other aspects of the job that weren't quite right, and it took a fair amount of courage (or maybe foolishness) to politely decline the Purdue offer, which was made before Indiana requested an interview. Fortunately, I was offered the Indiana job, and I was thrilled to join its faculty in the fall of 1976.

There is no graceful way for me to insert into the flow of this narrative the shattering, life-altering event my loved ones and I experienced 3 months after moving to Indiana. My first wife, Kristi, who I met at Luther, died unexpectedly from inexplicable heart failure, otherwise known as cardiac arrhythmia, just 3 days after celebrating her 29th birthday. Adequately capturing the grief and despair that her passing brought on to our family is not possible. I remain profoundly grateful for the outpouring of love, concern, and consolation from my extended family, longtime friends including my colleagues at Iowa, and my new colleagues at Indiana. The St. Thomas Lutheran Church congregation in Bloomington, of which we had been members for only a few weeks, was a remarkable source of a support. The weeks and months following Kristi's loss still are a blur. In some ways, my work and its weekly routines of teaching classes, meeting with students, and so forth were welcome diversions from far more challenging tasks.

Coming to Appreciate the IU Way

Indiana had a strong national reputation for preparing student affairs professionals. As with other nationally prominent programs in those days, such as those at Michigan State and Florida State, the senior Indiana faculty had been successful

executive-level administrators. For example, one of the well-known IU faculty members was Robert Shaffer, the founding president of the American Personnel and Guidance Association, who was for many years the Indiana University dean of students before joining the higher education faculty full time. Elizabeth Greenleaf led the IU student personnel master's program. She was previously a housing administrator at San Jose State before becoming the IU director of residence life. Dr. G, as she was affectionately known, had been the president of two large, influential national organizations, the American College Personnel Association and the National Association of Women Deans and Counselors. The reputations of Shaffer and Greenleaf were well earned and deserved, albeit garnered as much by more national leadership and administrative achievements as scholarship.

But the academic world was changing, not only for higher education and student affairs preparation programs but for other applied fields as well. From the outset, it was made clear that my role at Indiana was to complement the program's strong practitioner orientation by infusing more theory and research into the course work and student experience. Greenleaf, Shaffer, and most of the other senior faculty in the unit understood this and encouraged me at every turn to concentrate on publications and to the extent possible to seek funding to support my scholarship. In the first few years, I successfully obtained several small internal grants and two early career grants funded by the Spencer Foundation.

One of my teaching assignments at Indiana was a course on program evaluation in postsecondary environments. I had never taken such a course, nor had I read much about the subject. This meant I had to become an expert overnight! I taught this course several times but then effectively lobbied to steer higher education students to the school's generic evaluation course being taught by nationally recognized experts such as Egon Guba and Robert Wolf. Teaching the evaluation course brought home to me that there was a dearth of scholarship on evaluation efforts in higher education in general and in student personnel services in particular. This led to my first edited book (Kuh, 1979a), published by the American College Personnel Association. I was fortunate to convince some leading scholars (Robert Brown), scholar-practitioners (Peggy Barr), and practitioners (Dick McKaig) to contribute chapters.

I've taught a total of 17 different courses, 13 at Indiana and 4 at the University of Iowa in addition to practicum seminars and several summer credit-bearing workshops at Indiana, Iowa State, and Portland State. At one point in the early 1990s, I had taught every required course in the IU master's program.

For me, classroom teaching was the most challenging of any professorial activity. My teaching evaluations were always fairly good, and they improved some over time. Even so, in almost every class, there were one or two or three students who I apparently didn't connect with or reach, given their ratings and comments on the end-of-course evaluations. Reading those comments always haunted me. I treated the students' evaluation of my instruction the same way I dealt with anonymous reviews of the manuscripts I submitted for publication: I glanced quickly at them to get the overall picture and then put them out of sight for a few days before mustering the resolve to review them in detail. Despite my classroom shortcomings, of which I was very aware, I received teaching awards from Indiana and national recognition as well.

As others have said, it is also true for me: I have learned as much from my students as I may have taught them—if that is still an appropriate way to think about the nature of the transaction. Throughout my career, I was a stickler for precision in writing, my own and that of my students. One of the more instructive changes I made fairly late in my career was suggested by Megan Palmer, then an advanced doctoral student who was team teaching with me. She offered to draft a rubric that she felt would help students better understand what I expected in terms of clear, persuasive writing. We tweaked her draft rubric several times and tried it out with the class. The rubric was well received by students as it illustrated more concretely what I was looking for in terms of substance, organization, and clarity of expression. Equally important, the rubric made it easier for me to evaluate the students' work, something that people with experience using rubrics know full well.

I very much enjoyed and devoted considerable time and energy to student program and research advising at both the master's and doctoral levels. I chaired or directed 55 dissertations to completion and served as a member on some additional number of dissertation committees. I've also been an outside reader on dissertations done by students at universities in other countries, such as Australia, Canada, and South Africa. Of course, as with my own publications, some of these dissertations were better than others. But in every instance, by my reckoning, the final product was a piece of scholarship the student could be proud of.

The Midwest Meeting of Graduate Students in College Student Personnel

One of the first professional meetings I attended after getting to Indiana was the 1976 fall gathering of faculty members who taught in student affairs preparation programs. Most such programs are known today as higher education and student affairs (HESA) programs, a term we introduced at Indiana in the early 1990s. In the 1970s, though, they were mostly called college student personnel programs, the term used by the field's major journal, the *Journal of College Student Personnel*. During a conversation in my office with several master's students, I mentioned I was preparing a presentation for the meeting and was looking forward to getting to know my colleagues from other preparation programs in the Midwest, most of whom I knew only by reputation. Soon, the discussion turned to whether there were similar opportunities for graduate students to get experience presenting their research and program ideas and meeting people who would be their future professional colleagues. Out of that exchange was born the Midwest Meeting of Graduate Students in College Student Personnel, known to insiders by its unpronounceable acronym, MMOGSISP. Indiana hosted the first meeting in late January 1977, just a little more than 3 months following the idea's concoction. Today, no one in their right mind would for a moment contemplate trying to pull off such an event with so little lead time.

MMOGSISP was held annually for 30 or so years, often attracting more than 100 students from a dozen or more institutions. The site for the meeting rotated among

institutions with master's college student personnel administration programs, with the host school being selected as a result of what were occasionally competitive bids made by oral presentation in the concluding hours of the current annual event. The 25th MMOGSISP meeting was hosted by IU students in Bloomington at the sprawling Indiana Memorial Union. At that year's banquet, I was presented a yellow polo shirt with the MMOGSISP insignia, signifying I was—at one point—the “leader of the pack.” That shirt is a bit faded now, but it's still a wonderful reminder of what can happen when people get excited about a worthwhile idea.

Bending IU's Higher Education Program Orientation and Culture

At one time in the 1970s, Indiana University led the nation in the number of former or sitting presidents or campus executive officers with higher education doctoral degrees. My first doctoral student, Gary Ransdell, served with distinction for many years as president of Western Kentucky University. Another former student, Victor Boschini, was president at Illinois State University before becoming chancellor at Texas Christian University. I take great pride in their achievements and hope many other IU graduates will find themselves in similar positions.

Around the same time, starting in the late 1980s, there was an uptick in the number of IU graduates who became faculty members. By my count, about 55 graduates of the IU higher education doctoral program are teaching or had full-time faculty roles at some point in a graduate program somewhere: 42 of these people earned their degrees after 1980. This shift in career paths reflected the significant, intentional shift in the IU program's orientation—from appointing faculty members who were primarily former practitioners to recruiting faculty with strong interests in theory and research. This shift, in turn, affected the type of students considering IU for graduate work. It's also fair to say that many students who later became faculty changed their aspirations while working with faculty and peers during their doctoral studies at IU.

One of the most significant figures in enacting the shift in the mission and orientation of HESA's doctoral program was David Clark, a former dean of the IU School of Education, who returned full time to the faculty in 1977 after working for several years on grant-funded projects. Dave was more than a little intimidating, both intellectually and physically (he stood 6'6"). While he divided his time between the HESA program and the school administration program (which later became the educational leadership program), his presence had a dramatic effect on the kinds of students the HESA program began to attract, the nature of the program's curriculum, and the program's research profile. Dave left IU in about 1985 for a titled professorship at the University of Virginia, but by that time the shift in orientation of the HESA doctoral program was well under way.

In addition to his towering intellect, rigorous classroom expectations, and challenging dissertation advising, Dave did two things that had a concrete, lasting

influence on me and the new direction of the IU program. First, he led us through the process of having the Ph.D. reauthorized for the higher education program. As a result of a highly politicized relationship between the School of Education and the Graduate School, the authority to award a Ph.D. in higher education (as well as several other doctoral programs in the School of Education) was suspended in the late 1960s. With Dave's coaching, our petition to have the Ph.D. in higher education reauthorized went smoothly and we began awarding the degree in about 1980.

The second thing Dave did had a direct, significant impact on me and my career: He orchestrated my appointment in 1983 as department chair. The faculty members in the administrative unit to which the higher education and college student personnel programs were housed were essentially split into two camps; one included the "old guard," made up of professors who were former administrators in schools or colleges; the other group was comprised of faculty who had a stronger orientation to research. Prior to 1983, the department chair had come from the former group. The relations among individuals within and between both groups were generally congenial, but Dave and some others felt the shift to a stronger research orientation should be symbolically cemented with fresh departmental leadership. My appointment as department chair by the dean following a departmental vote was a strategic move that I didn't fully comprehend until some years later (I was the youngest faculty member in the unit at that time). For one thing, it put me in a legitimate position to be considered for an associate deanship, which happened 2 years later, in 1985, when Dean Howard Mehlinger asked me to be his associate dean for academic affairs, a position that included budget oversight.

One of the concrete outcomes of being department chair and associate dean for a total of six consecutive years was that we were able to strengthen the higher education and student affairs faculty in a period when it was most difficult to obtain new faculty lines or replace faculty who left or retired. During this time, we recruited Don Hossler and Frances Stage to join John Bean and me as the "young tenure-track Turks" in the higher education program. There were other strong faculty members in the larger unit; prominent among them was Martha McCarthy, in educational leadership, a renowned, highly prolific professor of education law, to whom I was married for 30 years. I cannot overstate the positive influence she had on my life and career.

Over the years, many productive faculty members joined the HESA program for varying lengths of time. I list them below roughly in the order in which they came to IU along with their most recent institutional affiliation: Nancy Evans (Iowa State), John Bean (IU), Don Hossler (IU), Fran Stage (New York University), Edward St. John (University of Michigan), John Thelin (University of Kentucky), Michael Parsons (Moorhead State University), Mary Howard Hamilton (Indiana State), Deborah Carter (Claremont Graduate School Claremont), Nancy Chism (IUPUI), Vasti Torres (IU), Gary Pike (IUPUI), Tom Nelson Laird (IU), Alex McCormick (IU), Victor Borden (IU), Danielle DeSawal (IU), and Lori Patton (IUPUI). The program also benefitted immensely by the presence of Trudy Banta, who was vice chancellor at IUPUI and whose tenured position was in higher education.

Another significant impact of taking on administrative roles early in my career was that the experience greatly informed and enriched my teaching and also, to a

lesser but nontrivial extent, my scholarship. Yogi Berra was right when he said, "You can observe a lot by just watching." This is one way scholars can learn about and reflect on events and their effects on individual and organizational functioning. But nothing can substitute for being in the moment, attempting to manage toward desired ends the many variables and personalities that make all politics local and lend themselves to multiple, sometimes competing interpretations. It also matters whether one has responsibility for the outcomes of decision and policy making and the individuals whose lives are directly and indirectly affected. Of course, taking on administrative assignments can detract from one's scholarly productivity. I was determined not to let that happen to a major degree, and because of a supportive spouse who was also an academic and understanding, forgiving children, I was able to continue to write and speak while serving my colleagues and the university.

Whether one intends to do so or not, being a department chair and associate dean signals to one's colleagues near and far that one is open to, and perhaps is even seeking, greater administrative responsibility. This situation can also raise suspicion in the eyes of colleagues, as one is thought to be teetering on the edge of going over to the dark side of bureaucratic, power-hungry authority. The immediate implication, aside from denying any such desire, is dealing with invitations and nominations for deanships. Those were always flattering, but I pursued only one: the deanship of the University of Iowa College of Education, where I had earned my Ph.D. I interviewed for the job in 1991. The experience was instructive and fun, especially because many of the faculty I knew from when I was a student were still there. Moreover, I felt that more than a few of them were pulling for me to get the nod. But I did not, which was almost certainly the right call for Iowa and for me. I didn't regret the dance or the decision. Other windows were about to open.

The CSEQ, Bob Pace, and Me

One of those doors opened in 1993 with a call from C. Robert Pace, then at UCLA, inquiring about Indiana's interest in becoming the home of the College Student Experience Questionnaire (CSEQ), which he developed. I became interested in Bob's work and the concepts of quality of effort and involvement in the late 1970s. Writing my ASHE-ERIC monograph (1981), *Indices of Quality in the Undergraduate Experience*, had also made me highly aware of the pioneering work of Alexander Astin and related research about the relationships between what students did with their time, what institutions provided, and desired college outcomes. Because of my ASHE-ERIC monograph, Bob was aware of my interest in the CSEQ and was immediately agreeable when John Schuh, a frequent collaborator, and I asked for permission to use some CSEQ items in a study we did in the early 1980s. My interest in the CSEQ turned out later to be a major turning point in my scholarly program and professorial career. For that reason, a couple of short stories about Bob Pace seem to belong here.

In November 1988, Bob invited me to lunch during the Association for the Study of Higher Education (ASHE) annual meeting to persuade me to use the CSEQ in the

College Experiences Study, a project described in my 1991 book, *Involving Colleges*, about which I will say more later. I was positively disposed, provided we could work out the logistics and I could find the money to pay for it, as we did not have funds for this purpose in the Lilly Foundation grant supporting the work. I also had to find money for our lunch, as even though Bob extended the invitation, he had forgotten his wallet! In addition, I had to convince my research team that administering the CSEQ would not detract from or compete with the qualitative nature of the research; my rationale was that the multi-method approach would enrich the study. With those details worked out, I followed some funding leads to use the CSEQ—the most promising being the Marriott Corporation, which at the time was providing contract food services on many campuses. I finally reached the appropriate person by phone during one of our research team meetings at a hotel in Indianapolis. As I explained the project to him, I emphasized that this was a serious research effort focused on meaningful out-of-class experiences, not another vacuous, irrelevant effort to rank colleges, such as the then-popular *Playboy* magazine list of “best party schools,” atop which that year again was Chico State. After a long pause, the Marriott executive said sternly, “That’s a bad rap”—and went on to explain that his son was a sophomore at Chico State and was having a terrific experience there. I don’t recall what, if anything, I said in response, but I was pretty sure I had blown the chance to get the loot we needed. By the end of the call, however, the deal was sealed and the small grant followed.

Even though I had several interactions with Bob over the years, prior to 1992, it never occurred to me to try to bring the CSEQ to Indiana. But he raised the prospect that year, and we had several discussions about how this might come to pass. My idea at the time was that graduate students would benefit from using the database to meet their inquiry course data analysis requirements and that we might produce an occasional research paper.

By 1994, we worked out the details for transferring the CSEQ from UCLA to Indiana. I “borrowed” \$15,000 from the School of Education dean’s office to pay off the small debt to UCLA that Bob had accumulated there. That amount looks trivial in retrospect, but at the time, it was a bit of a risk because Bob had positioned the CSEQ primarily as an institutional research tool, not a fee-for-service cost-recovery assessment project. And things would be different at Indiana than at UCLA, which provided Bob with office space and graduate student support. By that time, responsibility-centered budgeting had already taken root at Indiana, which meant that CSEQ income would have to cover all of its expenses. Fortunately, the assessment movement was ramping up, stabilizing the number of CSEQ users at about 40 per year, making it possible for me and the half-time graduate research assistant assigned to the project to make a go of it.

Soon it became clear that the CSEQ had the potential to be more than just a data set for graduate students to play with. We began to invest more time and energy in the project, updating the norms, publishing papers using CSEQ data, creating a fourth edition of the instrument, and developing the College Student Expectations Questionnaire—intended, among other things, as a precollege measure of student predilection to devote effort to educationally purposeful activities as well as an advising

tool. Still, even through the late 1990s, I had no idea that this tool would be the foundation for what later would become a major national initiative. More on that later.

One of the things that Bob wanted to do but never accomplished was to use Guttman scaling to assign weights to reflect the differential value of investing time and effort in various activities. For example, managing the resources of a campus organization requires more effort than simply being a member of the group. It would follow that a student managing resources would not only spend more time on the task but would also benefit more. This was something that intrigued me as well, but I never devoted enough “effort” myself to determine, by devising a weighting scheme, which student behaviors or activities were more and less important to various “outcomes.”

Institutional Improvement Work at IU

Another door that opened was the invitation to join the IU Bloomington Dean of Faculties (DoF) office in 1997 as associate dean with a portfolio focused on undergraduate improvement initiatives. The DoF office then was the campus academic affairs office, with the dean being the senior academic affairs administrator. The then-dean of the faculties, Debbie Freund (now president of Claremont Graduate University), said to me, “You are going all over the country, telling people what to do to promote student success. How about doing here what you are telling others to do?” It was an attractive “gotcha.” And I was open to the prospect, as the job was only part time and came with no line authority or responsibility—other than figuring out how to motivate key people to cooperate and collaborate on initiatives with promise to enhance the undergraduate experience. As I will elaborate later, we know a fair amount about what works in terms of fostering student success. Getting people to do the right things well is the main challenge.

Most of my influence as associate dean of the faculties came from administering a Lilly Foundation grant to IU for retention initiatives. The stars were aligned for the campus to launch some efforts focused primarily on first-year students that began to have the desired effects, such as Freshman Interest Groups (FIGs), a revised summer advising and registration program, a redesigned and shortened fall welcome week with a strong academic component, and study skills centers imbedded in freshman residence halls among other things (Hossler, Kuh, & Olsen, 2001a, 2001b). Some of the main players on campus who had to be directly involved were either former students or colleagues or both. For example, Bruce Jacobs was then responsible for auxiliaries and residence halls; Don Hossler, at the time, was responsible for enrollment management, including orientation. For whatever reasons, the first-to-second-year persistence rate ticked up and, in 2001 IU, was named *Time* magazine’s College of the Year for its innovative precollege summer seminar. I had nothing to do with the summer seminar, but I was able to help attract media attention as a result of the contacts I had begun to make from launching the National Survey of Student Engagement (NSSE) in 2000. Indeed, it was NSSE that cut short my time in the

DoF office, leading the IUB institutional improvement work to others. Unfortunately, as I write this, I am disappointed to report that some of the more promising efforts, such as FIGs, have been disbanded for various reasons. It is another example of how difficult it can be to institutionalize fragile improvement efforts.

I was again reminded of this recently in working with a large university that has to address, among other things, some “killer courses” that have D/W/F rates of up to 40%. In Vince Tinto’s (2012) book, one of these courses, general psychology, is used to show how, between 2001 and 2003, technology and engaging pedagogies were used in combination to reduce the D/W/F rate from 42 to 18% and the failure rate from 30 to 12% while also reducing instructional costs. Equally compelling in the example was that the performance of historically underrepresented students was as good as and occasionally exceeded that of majority students. It’s not clear how long this positive change persisted, but it has evaporated as the D/W/F rate in this same course, taught by the same faculty member, has again swollen to 40%. I take no special pleasure in discovering this, as I know that some of the promising practice examples featured in some of my own publications have been compromised for various reasons over time and have suffered similar fates.

Intellectual and Scholarly Interests

Most academics write about what we know or would like to know more about. Much of my scholarship prior to 1990 focused on student affairs administration and the out-of-class experiences of students, primarily undergraduates. These were areas with which I had some personal experience and learned more about in graduate school. In addition, they were areas that overlapped with my early teaching assignments, which were primarily in the student personnel administration master’s programs at both Iowa and Indiana. The annual meetings and journals of the two major national student affairs associations, American College Personnel Association (ACPA) and the National Association of Student Personnel Administrators (NASPA), were almost always receptive to my papers, and within a few years, I became involved with both organizations in various capacities.

I also had the good fortune of being named to a couple of national writing teams, the ideas of which held sway in the field for a period of time. The first was a NASPA group tasked with reviewing the *Student Personnel Point of View Student Personnel Point of View* (1937) on the occasion of its 50th anniversary. The impact of the report, *A Perspective on Student Affairs* (1987), was muted as the American Council on Education, the sponsor of the original 1937 document, declined to fully endorse the 1987 statement because of lobbying by former and current ACPA leaders who at the last minute opined that their organization should have had a role in the drafting and approval of the report. It was a harsh, stinging lesson about how petty politics can derail good intentions and exceptional work.

A second effort sponsored by ACPA had a happier ending. Charles Schroeder, a seasoned, highly regarded, visionary student affairs dean and the only twice-elected

ACPA president, convened a group of thought leaders in 1993 to ponder what the student affairs profession should do to become an even more important player on college campuses. The original motivation was to determine how to respond to the national reports of the day calling for more attention to undergraduate education (e.g., National Association of State Universities and Land-Grant Colleges [NASULGC], 1997; Wingspread Group on Higher Education [WGHE], 1993). Among those with me on the writing team were Lena and Sandy Astin, Art Chickering, Patricia Cross, Pat King, Susan Komives, and Patrick Terenzini. Our meetings, some of which were at Schroeder's mountain home in Estes Park, were intellectually stimulating and personally rewarding. One irrelevant, irreverent memory from one of these gatherings was my dropping a huge pan of lasagna and Pat Cross scooping it off the kitchen floor and back into the pan within seconds. No one complained! More to the point, the product of our work was *The Student Learning Imperative* (SLI) (American College Personnel Association, 1994). I somehow became the scribe for the group, which sometimes, as in this instance, allows for some of one's own ideas to find their way into the document. This report had "legs" and, for several years, was an organizing framework for national and regional meetings and journal articles. ACPA's new magazine, *About Campus*, was in part an extension of this kind of work, translating theory and research into practical actions campuses can take to promote learning and success.

The SLI's impact was furthered because Jon Dalton, NASPA's incoming president, recognized its potential for uniting and focusing the student affairs profession and made it the organizing theme for the national NASPA meeting at which he presided. This was a much-needed, timely, statesmanlike gesture, which ushered in an era of cooperation between the two associations. It also established the groundwork for subsequent national reports on which the two groups have collaborated, such as *Learning Reconsidered* (American College Personnel Association [ACPA] & National Association of Student Personnel Administrators [NASPA], 2004; Keeling, 2006).

By 1990, I was pretty well known in the student affairs rainforest. At the same time, my interests were broadening, stimulated in part by interactions with colleagues through the department chair and associate deanships I held. For example, I took occasional solo forays into other topics, such as needs assessment, and sometimes with coauthors, such as John Bean (on planning) and David Clark (on organizational theory). My interest in and work related to needs assessment came about when Leonard Burrello, a thought leader and professor in special education administration and now a longtime friend, asked me to be the evaluator on one of his federally funded projects. Len and I arrived at IU at the same time, and our offices were located in the same suite. Working with Len and his colleagues introduced me to how federal grants work and how steep and dense such bureaucracies are. Most surprising to me was that one grant-funded task, albeit one with which I was not directly involved, was to tell the federal government how much money it was spending on special education, where, and for what kinds of projects! I thought surely that somebody working full time at these agencies in Washington would have this information at hand. Not so!

Two of my books coauthored with Martha McCarthy (McCarthy & Kuh, 1997; McCarthy, Kuh, Newell, & Iacona, 1988) are based on national studies of the

educational administration professoriate conducted a decade apart. Using the data from the first study, I coauthored an article with Jack Newell (1989), a former ASHE president, on the higher education professoriate.

The department chair and associate dean assignments also prompted me to think more deeply about the factors that influence organizational performance. My collaborations with Dave Clark, mentioned earlier, were instrumental to reading more in these areas. Among the works I found most enlightening were those of Karl Weick. Also during this time, the mid-1980s, Japan's emergence as a world economic power was receiving attention, with much of its success being attributed to its workplace culture. Taken together, these ideas prompted me to offer a doctoral seminar focusing on culture in American colleges and universities. The discussions in this class led to the idea for my ASHE monograph (with Elizabeth Whitt), *The Invisible Tapestry* (1988). The intersections of institutional and student cultures and organizational and student performance have continued to be of keen interest to me, with these underlying ideas shaping my inquiries into strong performing institutions, resulting in two major books, *Involving Colleges* (1991) and *Student Success in College* (2005, 2010), as well as a host of articles based on those two major projects.

Involving Colleges was the major product from what was blandly dubbed the College Experiences Study (CES). The study was prompted by a series of conversations in 1987 with John Schuh, who retired in 2011 as distinguished professor at Iowa State University. In the 1970s and 1980s, John was the consummate practitioner-scholar, holding full-time administrative appointments in student affairs, first as a director of residence life (some of those years at Indiana) and then in higher-level generalist positions. In all of these appointments, John's publication record rivaled that of the most productive contributors to the student affairs literature. We collaborated on several writing projects in the late 1970s and 1980s. As John was about to move from Indiana to Wichita State, we began talking about a study that would look at high-performing student affairs organizations. My view at the time was that there would be more interest in our work if the unit of analysis were the institution, not an administrative unit, and if the study focused on the out-of-class experience. At that point in time, the Lilly Endowment, in Indianapolis, was funding some work in higher education, and Ralph Lundgren, an education program officer there, expressed interest. We secured enough money to assemble a nine-person research team to conduct at least two site visits to each of 14 colleges and universities nominated by experts because the institutions were known to provide unusually rich out-of-class experiences to undergraduate students.

The CES project was my first foray into multi-institution studies. It was also my first major qualitative research project. It is hard to imagine now, but qualitative research in higher education was still considered a suspect methodology in higher education graduate programs well into the 1980s. For example, students proposing qualitative research for dissertations frequently met resistance from faculty members on their research committees. I was not trained in qualitative research at Iowa. Indeed, in the heart of dust-bowl empiricism, qualitative research back then was an oxymoron! But Indiana, because of Egon Guba, was one of the few places to break through early. Although diminutive in stature, Egon was an intellectual giant. He came to

the IU School of Education in the 1960s to be Dave Clark's associate dean. Egon was a statistician but understood better than most that not everything could or should be explained in formulaic ways. He, along with Yvonna Lincoln, a former student who later became his wife, authored some of the early, influential texts about qualitative inquiry. Egon, with his imposing intellect, national reputation, and status at IU, along with several other Indiana faculty members using various qualitative inquiry approaches, legitimated the qualitative genre, so that by the 1980s, it was acceptable to use such methods at IU for dissertation research. Admittedly, I along with some of my colleagues learned as much about qualitative methods from our students who had taken classes from Egon as from other sources.

One of these students was Elizabeth Whitt, with whom I have collaborated on several major projects and publications, beginning with *The Invisible Tapestry*, then *Involving Colleges*, and more recently the research that led to *Student Success in College* (2005, 2010). Liz joined the CES research team as she was completing her dissertation research; she later accepted a faculty appointment at Oklahoma State University. With apologies to the others on the CES team, allow me to mention three others. Carney Strange, by then an associate professor at Bowling Green State University, devoted a sabbatical in Bloomington to the project. The CES was also the first time I worked with J. Herman Blake, who had been a senior administrator at several institutions and was a member of the writing team that produced *Involvement in Learning* (National Institute of Education [NIE], 1984), a report focused on higher education prompted by the National Commission on Excellence in Education's [NCEE], 1983 report, *A Nation at Risk*. I subsequently worked with Herman on other projects, including some improvement efforts when he was a vice chancellor at IUPUI. Many of the organizing principles and recommendations articulated in *Involving Colleges* and related publications were distilled from the rich experience and deep, reflective thinking of Jim Lyons, then-dean of students at Stanford University. I came to know him from the *Perspective on Student Affairs* writing team. He is among the wisest and nicest professionals I've had the good fortune to work with during my career. Research team debriefing meetings with him were always a marvelous mix of penetrating perspectives and insights into how institutions of higher education could organize to foster student learning and personal development.

The NSSE Years

As I said earlier, our expectations for moving the CSEQ to Indiana were modest: to continue managing a well-constructed measurement tool and making the database available for graduate student and faculty research. As important as those activities were, the assessment movement rolling across the landscape of American higher education portended that grander things were in store. Having the CSEQ at Indiana and increasing its visibility through publications and presentations made Indiana and my work viable contenders to host the initiative that became the National

Survey of Student Engagement, now known in many parts of the globe as NSSE (pronounced “nessie”). Parts of the NSSE story have been told elsewhere (Kuh, 2001, 2003, 2008), but it seems appropriate to briefly recap it here and add a few details that to my knowledge have not appeared elsewhere.

In the late 1990s, The Pew Charitable Trusts, under the guidance of Russ Edgerton, then-director of the education program, set forth an ambitious reform and improvement agenda. One of the “big ideas” was to create a tool that colleges and universities could use to determine the degree to which students were exposed to good practices in undergraduate learning. Peter Ewell was one of the people Russ relied on for advice, and following a meeting in 1998 at Pew headquarters, at which I was not present, Peter began looking for someone who could deliver such a tool that had both acceptable technical properties and practical utility. I knew who Peter was then but had never interacted with him.

To get the project going, Pew charged Peter and the National Center for Higher Education Management Systems (NCHEMS) to convene a design team to create the new tool (Kuh, 2009). About that time, I began to see Peter in the audience at some of my presentations based on the CSEQ and other research. When the invitation came to join the Pew design team, I accepted immediately. It soon became clear that an outfit had to be charged with seeing if the instrument and survey administration process could work as intended. Because IU had the CSEQ, I was asked to lead the try-out effort, which consisted of two rounds of field testing within an academic year. To say we were running fast and furious for those 10 months is an understatement. While the testing was under way, Peter and Russ issued an RFP to subsequently fully implement and run the project, envisioned to become a self-sustaining cost-recovery effort. Several universities and professional survey research centers were invited to bid. Indiana was selected, I’ve been told, for several reasons in addition to my sparkling personality.

First and most important, IU was the only bidder to propose a partnership between an established higher education doctoral program at a research university *and* a professional survey organization, the IU Center for Survey Research. It also helped that overhead and personnel costs in Bloomington tend to be lower than in many other parts of the country. Finally, having experience with the CSEQ mattered too, especially as about two-thirds of the items on the original NSSE were taken directly or adapted from the CSEQ.

The IU Center for Survey Research (CSR) was a full partner in this endeavor from the very beginning. John Kennedy, the CSR’s mild-mannered, expert director, traveled with me to the initial “getting to know you meeting” with Russ Edgerton in a Red Carpet Club room at Chicago’s O’Hare Airport, a confab brokered by Peter Ewell. I was uneasy during the 2-hour “interview” and recall at some point stating unequivocally that I was prepared to spend as many as 8 years establishing the enterprise, if that’s what it took. I’m not sure why I picked 8 years rather than five or nine or some other number. But it turned out that that’s about how much time I devoted to NSSE.

Our proposal to Pew included the nontrivial task of developing a version of a student engagement instrument for use in 2-year institutions. Of course, this suggestion was

ignored by Russ and Peter, who I learned later already had plans to ask Kay McClenney, an established expert on community colleges, to lead that effort. NSSE was about 2 years ahead of what became the Community College Survey of Student Engagement (CCSSE), and we happily shared what we were doing and learning with our colleagues in Texas. To solidify the working relationship, the NSSE director was named an ex officio member of the CCSSE board and vice versa, an arrangement that continues today.

None of us really knew then what the unnamed project that became NSSE could be or do. We've since in private and some public settings said that NSSE has well exceeded what any of us imagined in terms of becoming a self-sustaining enterprise yielding actionable data for improving the student experience. It has also helped to shift the national discourse about what matters in college from what institutions have—resources by way of faculty accomplishments, physical attributes, and student backgrounds—to what students do with these resources.

To be clear, NSSE was not the only effort to stake out this position, nor was it the first. Chickering and Gamson's (1987) Good Practices in Undergraduate Education are well represented in one form or another throughout the questionnaire. NSSE's conceptual framework and many other items on the questionnaire had been available for more than a few years. A long list of prominent scholars and policy makers proffered congenial views—Nevitt Sanford, Douglas Heath, Ken Feldman, Ernie Boyer, Art Chickering, Zee Gamson, Ted Newcomb, Sandy Astin, Bob Pace, Vince Tinto, Ernie Pascarella, Pat Terenzini, Pat Cross, and many, many more. What NSSE had going for it was a confluence of external factors that came together to create the (now overused) "perfect storm" of conditions that helped NSSE prosper in terms of generating interest by people inside and outside the academy and capturing sizeable market share within a few short years (Kuh, 2009). Accreditors were demanding (finally) that institutions show evidence of student attainment *and* were taking action to improve it. It also helped that the media expressed interest in what was happening on college campuses at a renewed level, and major national philanthropic organizations, with Pew in the lead, were investing again in institutional improvement and innovative practices focused on undergraduate education.

With the guidance and encouragement of an esteemed national advisory board and the Pew largesse (about \$3.7 million over 4 years to launch and fully implement the initiative), we heeded Sandy Astin's sage advice: To make a difference and change the discourse about undergraduate learning, this new effort (NSSE) had to be more than another annual questionnaire survey leading to a steady stream of papers appearing in places only accessible to academics. Rather, it had to have the characteristics of a campaign—public, open, useful (especially by those paying for it), and relentlessly persistent in pursuing a communications strategy using language laypeople would understand. NSSE set out to be such an enterprise and to establish an industry-leading standard for working with institutions in ways that made data about students important to the decision-making process.

One of the main reasons the field embraced NSSE was that the results from the annual survey were actionable. That is, even though NSSE is a short and in some ways blunt tool, faculty and staff as well as students could look at the data and

identify student and institutional behaviors that were not up to par and take action to address them. What if students who do not write many papers also report not improving their writing ability? Identify who they are by major field and assign more writing! What if students in certain major fields say they do not get prompt feedback from their faculty? Convene the faculty and discuss whether that is acceptable and, if not, what to do about it! If students report that their exams are not particularly challenging, an institution can disaggregate the data to determine whether this is an institution-wide issue or whether it is concentrated in some fields or the experience of certain groups of students such as women or students of color in certain majors.

The NSSE Board

One board-dictated policy that brought NSSE to the attention of senior institutional leaders was that its annual national report and press releases along with the institution's own data report be sent directly to the president at the same time these materials went to the institutional research or assessment office and the institution's media relations office. This triage effort at first caused some consternation among some seasoned IR personnel who were not used to getting calls from the president's office to explain the nature of the student experience, especially if the comparisons with peer institutions were not especially flattering! Within a few years, this concern all but dissipated. Indeed, I think the role and value of the campus IR operation actually was enhanced to a degree by raising awareness on campus about the value of its work and these kinds of data.

Two analogies from early board deliberations shaped and continue to influence NSSE's culture and corporate psyche. The first was Doug Bennett's observation that to be valued and add value, the operation had to think of itself and perform like a public utility—something that people would be willing to pay a reasonable, fair-market price for because it provided a reliable and needed service. While NSSE needed opinion leaders including its board to champion its work, it also had to deliver the goods: trustworthy data that institutions could use to identify areas where the student learning experience was satisfactory or better, as well as areas where improvement was needed.

The second analogy that shaped how NSSE came to think about itself and how it might influence thought and action came from Bob Zemsky, who likened our work to volleying in a tennis match. It would never be the case, he argued, that NSSE (or any other national survey for that matter) could continuously blast big, hard serves of information—such as its annual findings—that would keep the project in the public eye for more than a few days a year. Rather, NSSE's best chance to influence how people thought about collegiate quality would be to respond (volley back) with insights and information to inquiries, for example, from the media and policy makers discussing and debating these ideas. In this way, NSSE would become known as a go-to, reliable, trustworthy, and authoritative source to which the

media and others could turn for information about issues relevant to the quality of undergraduate education. For example, if a news story broke about an issue related to fraternity life or athletics, reporters could contact NSSE to see if it had data that could shed light on the nature of that aspect of college experience. If NSSE had some relevant information, fine. But if not, NSSE might also volley back, by sowing seeds during the conversation about what really matters to collegiate quality (engagement), and in the process develop a relationship with a media representative who could perhaps be helpful with the campaign at a later date.

Bob's advice was right. Over time, telephone inquiries that were not about engagement per se often led later to stories about engagement and collegiate quality. Of course, the media first needed to know that NSSE existed. And this is where the advice of Bill Tyson, of the Morrison and Tyson public relations firm, was indispensable.

Media Relations

From the beginning, Russ Edgerton knew that for NSSE to accomplish its mission, it would need attention from the national media. Bill Tyson helped us do that by contacting the media on our behalf. For example, he arranged meetings for me with reporters from influential dailies, such as *The New York Times*, the *Washington Post*, and *USA Today* as well as the appropriate people at *The Chronicle of Higher Education* and the then-upstart *Inside Higher Ed*. Equally important, he advised us how to tell the NSSE story in a credible, persuasive manner, including among other things how to craft press releases and annual reports as well some related materials in ways that were easily consumed and understood by general audiences. Bill's 2012 book, *Pitch Perfect*, refers briefly to his work with NSSE and the Community College Survey of Student Engagement (Tyson 2012).

I can't resist telling one media-related story. Bill's coaching was straightforward, such as for me to write out a list of the four or five key things I wanted the reporter to remember and not to say anything I would later regret. Well, I handled the first of these lessons reasonably well but stumbled a few times on the second. For example, there was a fair amount of early buzz about NSSE among insiders at meetings such as AAHE and AIR, in part because Peter Ewell and I made the rounds to pitch the project during its field testing. This, in turn, generated more than a little apprehension on the part of some IR people that NSSE might challenge the comfortable status quo by making public institution-specific results. This prospect (which did not come to pass), coupled with NSSE's announced intention to send institutional reports directly to presidents, challenged the established assessment and IR norms and prompted chatter on listservs about me and NSSE.

In one posting, for example, someone likened me to the Darth Vader of higher education, about to violate the code and publicly embarrass institutions by posting their NSSE benchmark scores. Another commented, "Kuh used to be one of the good guys" (ostensibly referring to my work with the CSEQ), "but now he has gone over

the dark side....” Near the end of an animated conversation with several staff reporters at the offices of *The Chronicle of Higher Education*, I congenially recounted this listserv thread to those assembled, including the Darth Vader analogy. As soon as we got into the elevator, Bill looked at me and said, “Your Darth Vader line will be featured in the story tomorrow.” And sure enough, it was. Ouch! But as Bill often would remind me, there (usually) is no such thing as bad publicity. NSSE and I got some every once in a while, but most of it was helpful to the cause.

My name will always (I hope) be associated with NSSE, and as I often say, there are lots of worse things to be called than “the NSSE guy.” But NSSE is much bigger and more important than one person, and while I am willing to accept my share of plaudits for NSSE’s accomplishments as well as criticisms for its shortcomings, whatever good the project has done is a function of many unusually talented, committed people who share a common belief in using data to help institutions improve the learning conditions for all students. So many outstanding people have worked and are working at NSSE that it is not fair to name some and not others. But I must mention one.

In the 1999 field test year that, as I said, constituted two trial runs, NSSE was staffed by me and a higher education doctoral student, John Hayek, who started out with a half-time appointment. We contracted with the CSR staff to implement the survey. Within a few months, John became a full-time staff member. His background was somewhat unusual in my experience for a higher education graduate student. Hayek’s most recent prior work was with youth soccer in Florida, where he did a variety of things including marketing. This turned out to be very important, as it was second nature for John to be constantly thinking of ways to make NSSE visible, useful, and memorable, while I was concentrating on how to ensure data quality and legitimacy in the academic community. In retrospect, we were a strong, complimentary team for a start-up in higher education. More than anyone, John’s entrepreneurial instincts were exactly what NSSE needed to prosper in the early years.

The NSSE Institute

While much energy and attention was devoted to implementing the annual national survey at the highest industry standards of quality, we also knew early on that we also had to invest effort in helping institutions use their results effectively. This was the primary reason we created the NSSE Institute for Effective Educational Practice in 2002. Since then, with ongoing leadership from Jillian Kinzie, the institute has engaged in a variety of projects and partnerships to help faculty, administrators, and governing board members effectively link information about student experiences and devise practical approaches to improve academic programs and support services. A second, practical reason we created the institute was to keep the budgetary lines clear between income derived from institutional participation fees and income from grants and contracts for research and consulting. For example, for internal bookkeeping purposes, the grant to support the DEEP initiative, which I will

describe later, and the royalties from its products are assigned to the institute, and this income is used to underwrite R&D activities, support staff and graduate student travel, and other activities consistent with the institute's mission.

The Occasional NSSE Migraine

While I have many fond memories of the NSSE days, some were not so pleasant. Perhaps in time I will put together a more complete account of the experience. For now, let me share a couple of challenging experiences with this large national project. One of the more time-consuming annual activities was securing approval by the Indiana University Institutional Review Board (IRB), the entity ensuring the protection of human subjects. On one level, obtaining approval was a relatively straightforward annual exercise; after all, completing the core NSSE survey was voluntary and the nature of the questions did not pose risks to respondents. But as NSSE grew in size and complexity, the IRB process became more complicated. Within a few years, NSSE was translated into Spanish and French (the latter for use with schools in Quebec, Canada), and every annual administration included several sets of consortium-specific questions as well as experimental questions dealing with various topics such as high-impact practices (Kuh, 2008) that were appended to the core survey for selected institutions.

One of the perennial challenges for most colleges and universities has been how to increase response rates. To address this matter, we asked several NSSE graduate research assistants to scour institutional websites and other sources to discover what institutions were doing in this regard. At some point, a long, unvetted list of such examples was posted to the NSSE website. This list of ideas (not all of them were things schools actually did) came to the attention of IU IRB in early 2006. One of the more questionable suggestions was to give those students who completed the NSSE preference for registering for classes the following academic term. This, the IRB determined, created a situation whereby students would feel coerced or compelled to do something against their will. Another suggestion was that institutions contacted potential respondents as many times as possible, which was in direct conflict with the IRB-approved limit of five total contacts.

Because these ideas and other questionable suggestions were on the NSSE site, it appeared that NSSE was endorsing these procedures. This was not our intention; in fact, it was an administrative oversight (*mea culpa*) that the list was posted without serious internal review. Another of the so-called irregularities the IRB found as it looked more closely at the NSSE website was a link to a poster used at a participating school announcing the survey on which the font size of the incentive to participate (raffle for a spring break plane ticket) was larger than the font used for the invitation script itself. These discoveries prompted the chair of the IRB on February 1, 2006, to instruct NSSE to immediately shut down the survey until these and other perceived irregularities could be thoroughly reviewed and addressed.

The directive to shut down the survey gave us a huge damage control problem, as it came about 3 days after invitations to participate were sent to about 900,000 students in the USA and Canada. Of course, we took responsibility for the lack of oversight as to what was on the NSSE website. A week or so later, after providing documentation that addressed, among other things, that the website had been corrected, we prevailed in a face-to-face meeting with the IRB executive committee and were allowed to reopen the survey. The font size dispute also was settled as something that was beyond NSSE's control.

Several weeks later in that same survey cycle, the IRB discovered that we had neglected to submit for review that year's invitation to participate translated into Spanish. We used the same letter as the previous year, but the one Puerto Rican university administering NSSE in this round made a few minor changes to the letter. My heart sank again when the IRB warned that this oversight could be reason to shut down the survey again. Fortunately, the IRB determined this to be a minor infraction that did not coerce students to complete the survey. However, to protect all parties, we were instructed to remove this school's data from the national norms and could not use its results for research purposes. We were happy to comply!

I was teaching my campus cultures seminar that spring term and have vivid, not-so-pleasant recollections of checking my BlackBerry during breaks from class only to discover another disconcerting missive from the IRB about one thing or another. Needless to say, it was hard to concentrate on class discussions in the second half of that weekly seminar meeting!

A Word About NSSE's Contributions to the Literature

On a happier note, the NSSE database made it possible to examine some aspects of the undergraduate experience about which a fuller understanding was needed. How to increase educational attainment, especially by historically underrepresented groups, was getting more attention from the federal government; business and industry leaders and philanthropic organizations also had signaled their keen interest in this and related areas. NSSE conducted some studies linking student engagement data with persistence and other records of student performance such as transcripts, from which we learned more about the nature of the conditional and compensatory relationships between student engagement and desired college outcomes (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008; Kuh, Kinzie, Buckley, Bridges, & Hayek, 2007). Other researchers were finding similar patterns of findings (Cruce, Wolniak, Seifert, & Pascarella, 2006; Pascarella & Terenzini, 2005).

One unexpected finding was the unusually powerful effects of participating in what are now widely referred to as high-impact practices (Kuh, 2008). On a hunch, I asked the crack NSSE analyst team to begin looking at the relationships between engagement (including an experimental deep learning scale), self-reported outcomes, and some of the items that made up the enriching educational experiences benchmark. Of particular interest to me were activities such as learning communities, study-abroad,

and student-faculty research, as the literature about these experiences was on the whole quite promising, and it seemed to me that when implemented well, these experiences would be highly engaging. Sure enough, students who reported doing one of these were much more likely to participate in the effective educational practices measured by NSSE, and they also reported gaining more from their college experiences than their peers without these experiences. These findings prompted the American Association of Colleges and Universities (AAC&U) to poll other researchers looking at similar questions. This work ultimately led to AAC&U listing ten high-impact practices in its 2007 report for the Liberal Education and America's Promise (LEAP) initiative (Association of American Colleges and Universities, 2007). Others have subsequently found similar patterns of results (Blaich, 2009; Brownell & Swaner, 2010). Additional evidence is coming forth from several California State University campuses (K. O'Donnell, personal communication, May 25, 2012) that participating in these kinds of activities also is related to persistence, with students of color being slightly advantaged in terms of the compensatory bump they receive from taking part in one or more of them.

Leaving NSSE

My departure from NSSE in 2008 was long planned and was triggered primarily by stipulations that applied to me in IU's retirement program. In short, I could not activate the monetary payout IU owed me once retired and also receive income from IU or any state agency if I retired. For this reason, despite my strong attachment and identification with NSSE, I knew when overseeing the project and related efforts had to become someone else's responsibility. The NSSE board along with my colleagues in the IU higher education program conducted a national search that brought Alex McCormick to the helm, a wise decision, indeed.

The Center for Postsecondary Research

One of the more important contributions of the NSSE project to Indiana University and its higher education graduate program was the formal approval by the IU trustees of the establishment in 2003 of the Center for Postsecondary Research (CPR). Some of the better known graduate programs in higher education are affiliated with a research center, and in the 1980s, my good IU colleague, Don Hossler, and I began to talk about the viability of creating such a center. We were unable at that time to persuade IU to commit resources to such an entity.

After the CSEQ was transferred from UCLA to IU, we had an ongoing line of income-producing activity, but the CSEQ revenues could underwrite little more than the project annual operating costs and a graduate student's compensation package. After NSSE was up and running, we needed space, clerical support staff, and other infrastructure. The infrastructure needs intensified as other projects came

on line, such as the Faculty Survey of Student Engagement (FSSE), the Beginning College Student Survey of Engagement (BCSSE), and the Law School Student Survey of Engagement (LSSSE). FSSE and LSSSE warrant brief mention, as neither was on our radar screen when NSSE began.

The idea for FSSE came from Robert Smallwood, who was a faculty member and assessment director at what was then Southwest Texas State University (now Texas State University). Bob took an early interest in NSSE; in fact, his institution was one of the schools in the first NSSE field test. He also hosted the first NSSE workshops in San Marcos. In fact, it was at one of these early workshops that the dean of the college of arts and sciences there, referring to NSSE, declared, "Now, we finally have a test worth teaching to!" Her point was that NSSE was a tool focused on the student and institutional behaviors that mattered to learning. The events Bob organized further convinced him that if we could adapt a version of NSSE for faculty members, the engagement constructs and language would be easier to communicate and over time would cultivate more faculty interest and enthusiasm for the work. With a nod of approval from me, Bob helped create that beta version—with assistance from NSSE staff, one of whom was Judy Ouimet, who later left NSSE to help the CCSSE staff during its start-up years.

Surprisingly, the idea for LSSSE came up immediately following a brief presentation about NSSE at the December 2000 meeting of the American Council of Education Secretariat, the group of Washington-based higher education associations. Carl Monk, then-executive director of the Association of American Law Schools (AALS), followed Russ Edgerton and me out of the room and asked if the engagement ideas would apply to law school education. The seed was planted, but the NSSE board discouraged doing anything in the near term, as we needed to focus on establishing NSSE and its brand. There also was early interest expressed to adapt NSSE for other use in other countries. Here, too, the NSSE board was quite direct about avoiding such entanglements, although it approved some small-scale trials as part of other projects and the use of licensing arrangements, which is how the Australian and South African adaptations were originally handled. The NSSE board was, as always, correct; we had a tiger by the tail and more than enough to do.

However, a NSSE graduate research assistant pursuing a J.D./Ph.D. degree, Patrick O'Day, was enamored with the idea of a law school student engagement tool and mentioned it to some IU law school faculty. Within days, the then-dean of the law school, Lauren Robel, was ready to administer a law school student engagement survey; the only problem was we had not yet developed it! Several months later, after consultations with IU law faculty and staff, we administered to IU law students the beta version of what became LSSSE. The IU law school is one of the schools that have administered the instrument every year since. My successor as LSSSE director, Carol Silver, an IU law professor, took over the project in the summer of 2010. By 2012, 178 accredited law schools in the USA (82% of the total) had used LSSSE at least once, and LSSSE, like FSSE, has been self-supporting since its inception. LSSSE participants have included few top-tier law schools, however, a phenomenon also experienced by NSSE, as only a very small number of institutions in the Consortium on Financing Higher Education (COFHE) have participated in the undergraduate student

engagement survey. COFHE member schools have their own student experiences questionnaire that includes many items similar to those on NSSE. Apparently, worry persists that if comparative data were available, the most selective institutions in the country would not always come out on top on engagement indicators, something that Ernie Pascarella and I pointed out in our article in *Change* (2004).

I mention the growth of FSSE and LSSSE to illustrate that CPR had to establish an infrastructure sufficient to support multiple continuing cost-recovery projects as well as other funded work, of which there has been a substantial amount. According to Marilyn Gregory, the CPR business and finance manager, between 1999 and spring 2012, CPR generated just over \$52,000,000 in the form of external grants and contracts and institutional participation fees for its various national projects. All this was accomplished without any budgetary investment by Indiana University, other than the \$15,000 loan, which we repaid, to move the CSEQ from UCLA to Indiana and expenses for some project space as part of negotiated overhead cost agreements between the university and funding agencies.

My Work on Student Success

Creative swiping is commonplace among industry leaders and even start-ups in the for-profit sector (Peters, 1987). My sense is that over the past decade, faculty and certainly staff have become more willing to do something similar, especially if they see what people at other institutions like their own are doing to make progress. I don't mean to say that people will adopt the same practices willy-nilly, without critical analysis and more than a little tinkering. But at least their willingness to entertain different approaches and models seems to have increased. Within a few years, the NSSE database and the number of participating institutions were robust enough so that outliers—colleges and universities that were more “engaging” than their peers—began to become evident. Our sense was that the field could benefit from learning more about what these high-performing schools were doing to foster student engagement and success. Thus was born the idea for the Documenting Effective Educational Practices (DEEP) study.

We revisited the case study methodology used in the College Experiences Study (Kuh, Schuh, Whitt, & Associates, 1991), fine-tuned it to match the DEEP research purposes and questions (Kinzie et al., 2006), and together with Barbara Cambridge, who was then at AAHE, pitched the idea to Lumina Foundation for Education in the spring of 2002. The response was favorable. Jillian Kinzie, John Schuh, Liz Whitt, and I then invited 23 additional people to join the research team. Several of these colleagues were affiliated with Wabash College, which is not the first place one might look to staff a project like this. The back story is that I had met Andy Ford, then-president of Wabash College, at a meeting hosted by the Council for the Advancement of Education, which was contemplating launching a new measure of generic skills now known as the Collegiate Learning Assessment (CLA). Andy told me that Wabash had just received \$20 million dollars from the Lilly Endowment to create a Center of

Inquiry in the Liberal Arts, which was to be both a facility where people interested in the liberal arts could come together to discuss and study related issues as well as a programmatic effort to examine issues affecting the liberal arts. Constructing a building was something Andy and Wabash had experience with. Creating a research and development operation was far less familiar territory for them.

After a few more discussions during which I described my plans for the DEEP project, Andy suggested that the not-yet-established Wabash Center of Inquiry in the Liberal Arts (CILA) might be willing to join partners with the DEEP research team, provided that several Wabash College faculty or CILA research fellows could participate in the field work by visiting institutions and participating in research team meetings. This way, Wabash CILA staff would get some firsthand experience with higher education research and the DEEP project would get some additional resources. We drafted a memorandum of understanding between Wabash and IU's CPR to formalize the relationship and outline the work. The link between Wabash and CPR was then and remains win-win.

One of the Wabash faculty members who joined the DEEP research team is Charlie Blaich, who was at the time an assistant professor of psychology. He has since acquired considerable expertise in the assessment arena and is CILA's director of inquiries as well as one of the principal investigators for the Wabash National Study, a multiyear, multiple-institution, longitudinal research project examining the effects of liberal arts education on student outcomes. The seeds for the Wabash National Study were sown during a meeting I helped Andy Ford organize at Wabash in the summer of 2002. The purpose of the meeting was to bring together some of the best higher education scholars to generate a possible agenda for CILA, and I extended invitations on behalf of Wabash. My recollection is that about 20 people participated, including Ernie Pascarella, Marcia Baxter Magolda, and Patricia King, all of whom at one time or another worked on the Wabash National Study.

The DEEP research team was a very productive, congenial, highly skilled, and experienced group. The major book (Kuh, Kinzie, Schuh, Whitt, & Associates, 2005) and other DEEP publications were well received; equally important, the work has had "legs," in that we still get invitations to visit campuses to talk about the implications of our findings for local applications. Part of the staying power of the DEEP work is that we were asked by the publisher, Jossey-Bass, to consider updating the findings, which we did (Kuh, Kinzie, Schuh, Whitt, & Associates, 2010), and we also reported in several other places (e.g., Kuh, Kinzie, Schuh, & Whitt, 2011). The DEEP work in combination with another Lumina-funded project, Building Engagement and Attainment of Minority Students (BEAMS), managed by AAHE with NSSE staff participation (Bridges, Cambridge, Kuh, & Leegwater, 2005), put student success at the center of my work, which continues today.

Another activity that further deepened my focus on student success was a contract from the National Postsecondary Education Compact (NPEC) to do an extensive review of the literature related to student success. My research group at CPR was one of five funded to do this work, which subsequently comprised the featured presentations at a 2007 invitational symposium on student success, attended by about 700 people, in Washington, DC. The then-secretary of education, Margaret

Spellings, welcomed those assembled, who devoted 2 days to the dialogue. To my mind, these papers (<http://nces.ed.gov/npec/papers.asp>) are among the richest, most comprehensive sources of what research shows about fostering student success in postsecondary education. For reasons I still do not understand, little was done to publicize or disseminate this work more broadly. My team published an abbreviated version of its report as an ASHE research report (Kuh et al., 2007).

The Post-NSSE Years

I had a pretty good life and career before NSSE and am happy to say that it continues today. In fact, although, as I write this, I have been officially retired from IU for 2 years, I continue to be (intentionally) busy with various activities including a couple of projects that began to unfold in my last few years at Indiana.

SNAAP and Alumni Surveys

Sometime in 2006, I took a call from Ellen Rudolph, at the Surdna Foundation, who asked me some questions about NSSE and then described a project she and some arts education leaders were discussing that would involve surveying graduates of arts intensive training programs about their careers and lives. The project had little interest to me at the time, in large part because I don't know much about arts education and was also quite busy with other activities. Some months later, a consulting firm working for Surdna contacted me. Its task was to identify an organization with the capacity to develop, launch, and sustain a self-supporting alumni survey. We agreed to host the group in Bloomington to answer their questions and provide advice.

Several months later, Ellen Rudolph called again and said—insisted, really—that I and CPR had to do this work. She explained that IU's CPR met or exceeded every criterion they had in mind; our NSSE track record among other things made us the unanimous recommendation of the consultant. I remained skeptical, even dubious. Once again, for advice I turned to my trusted colleague and coconspirator, John Kennedy, at CSR. He and his survey research team would be key to whatever this alumni survey project would become. After hemming and hawing for a few days, I put the question directly to John: "Do you really want to do this?" A moment later he replied in his soft but firm voice, "Well, I think it will be interesting...." And that's how I got involved with the Strategic National Arts Alumni Project, or SNAAP. At points in the questionnaire development and field testing phases that presented an especially difficult challenge, and there were many, I would turn to John and ask him if the project was still "interesting." After a while, I would just look at him at such times and he would simply nod and smile, to acknowledge and answer my question.

SNAAP is an annual online survey, data management, and institutional improvement system designed to enhance the impact of arts school education. It was originally

called the “Surdna National Arts Alumni Project,” but we knew Surdna could not be in the project title as it would discourage other funders from participating. “Strategic” was the only “S word” that seemed plausible. To my knowledge, the 56,000 graduates from 239 different high schools, colleges, and universities that have participated through the summer of 2012 make up the single largest database on the educational backgrounds and careers of graduates of arts intensive training programs.

The SNAAP project presented a significant learning curve to me, knowing little about arts education. I earned three degrees but never even had an art appreciation class. In another important way, SNAAP has brought me full circle, in that my dissertation research involved alumni. And in the few years prior to SNAAP, I have with increasing frequency pondered the need for a tool that would help determine how well college prepares graduates for their lives and careers afterward.

Almost every college or university administers an alumni survey, but these are typically about satisfaction with the undergraduate experience and postcollege activities and involvements, such as jobs held and community service. There are a handful of multiple-institution and dozens of single-institution studies of alumni about the extent to which the developmental changes in values and interests associated with college attendance persisted, were accentuated, or regressed after graduation. Neither the instruments used by individual institutions nor those currently available from vendors or affinity groups systematically attempt to determine the extent to which the college experience provided what the graduates say they need to know and be able to do to effectively manage postcollege challenges. Such information is especially important, given the contingent economy recent college graduates must contend with, in which holding multiple jobs for fixed periods of time is becoming commonplace and a premium is placed on entrepreneurial skills. While narrow training in a specialized area may be suitable for some, over the long haul, the majority of graduates of postsecondary programs will need cognitive flexibility, inventiveness, design thinking, and nonroutine approaches to address the messy problems in managing rapidly changing and unpredictable global forces—the kinds of outcomes emphasized in the AAC&U LEAP initiative and more recently operationalized in Lumina’s Degree Qualifications Profile (DQP).

To state the problem plainly: How well does college-level learning today match what graduates need to know and be able to do to survive and thrive in the twenty-first century? Answers to this general question have important implications and applications:

- First, colleges and universities can use information from recent graduates to modify curricular and cocurricular offerings.
- Second, the data can be used to establish baseline and comparative information for individual institutions to track the quality of preparation of different alumni cohorts over time. Such results would be of interest to governing boards, school leaders, and faculty and staff in determining whether the institution is providing its graduates what it promised and what graduates need.
- Third, the findings from scores of institutions could be used to estimate and compare sector performance in response to calls for accountability and transparency.
- Fourth, accreditors and others responsible for quality assurance could incorporate individual institutional results as part of their oversight and due diligence.

- Fifth, state and federal policy makers and government officials could use the information to justify decisions about resource allocation.
- Sixth, business leaders and policy makers could use the information to determine whether higher education is providing the nature and quality of learning needed for various local, regional, and national sectors to remain economically competitive.
- Seventh, researchers can use the results combined with collegiate achievement measures (e.g., grades, tests, performance appraisals) to determine the validity and utility of these achievement measures.

One promising approach I have pitched to funders, albeit unsuccessfully, is to develop a scenario-based questionnaire administered via the Internet to recent 2- and 4-year degree recipients to determine how well they are prepared to survive and thrive in the twenty-first-century economy. The focus on recent graduates is preferred for two reasons. First, the more recent the college experience, the more accurate respondents will likely be in terms of attributing knowledge, skills, and abilities to what they learned in college or later. Second, faculty and staff will likely find more useful information from recent graduates, as these alumni experienced the existing curriculum as contrasted with graduates who finished a decade or more earlier. The animating feature of the tool could be a series of scenarios that ask respondents how well their postsecondary experience prepared them to effectively perform the task outlined in the scenario, with the response format a rubric-like adaptation of the skill and ability levels demanded by the scenario.

Such a project must address and overcome significant challenges, one of which is obtaining accurate email addresses for graduates from participating schools. In my SNAAP project, we contract with a “people finder” vendor, Harris Connect, which can add on average another 15% or so graduates with accurate email contacts to the institution’s database. Another challenge is motivating alumni respondents to put forth the effort needed to give us confidence in the validity of the results. A similar challenge holds for exiting senior tests like the Collegiate Learning Assessment—that of encouraging respondents to try hard to represent their best work.

The kind of tool I envision remains elusive, perhaps impossible to develop and administer so that the results are meaningful and useful. Perhaps someone more creative than I will do so. We can hope.

NILOA

Assessment of student learning outcomes continues to occupy my time and mind these days in large part because of my work with the National Institute for Learning Outcomes Assessment (NILOA). In November, 2007, just after the release of that year’s NSSE annual report (my last), Stan Ikenberry contacted me to talk about a symposium idea which might lead to a monograph about the current state of learning outcomes assessment. During several more conversations, we began to flesh out our respective conceptions of what the field needed at this moment in time. We agreed on

the need for an independent, objective authority that would promote promising assessment practices and help colleges and universities respond to legitimate public interests for transparency and accountability. Before embarking on the “good ship” NILOA, I did not know Stan Ikenberry well, having been with him on only two occasions I could recall. But working with him over the last 4 years has been a career highlight. He is among the wisest and kindest people I have ever met.

In early 2008, Stan and I began talking with foundations for the resources required to create an entity that would track and support the progress of colleges and universities as they respond to calls for greater attention to the assessment of learning outcomes. Lumina Foundation for Education provided a leadership grant, which helped leverage interest and ultimately support from the Carnegie Corporation of New York as well as the Teagle Foundation. These investments ensured 3 years of effort, and we hit the ground running by establishing a national advisory panel made up of higher education association leaders, policy makers, some institutional executive-level personnel, and accreditors. Several months later, we had the skeleton of what would become a “go-to” continuously updated website chock full of resources (www.learningoutcome-assessment.org). Since then, we’ve conducted national surveys (e.g., Kuh & Ikenberry, 2009) and have produced a series of occasional papers, a monthly newsletter, and more.

A year into this work, just as we were hitting our stride, the University of Illinois—where NILOA is housed and I have a part-time appointment as adjunct professor—prevailed upon Stan to serve as interim president of the university after a series of disappointing revelations about institutional governance irregularities and other problems that had accrued over time. His absence from NILOA for a year was sorely felt by me but was essential for restoring faith in a great university. Fortunately, the team of graduate students at the University of Illinois and other good colleagues at Indiana and elsewhere working on NILOA did more than their share to pick up the slack.

Others will render their own judgments about our contributions, but apparently they have been good enough for us to secure another round of funding from Lumina starting in early 2012 for work related to its Degree Qualifications Profile. Teagle also renewed its commitment for us to among other things think through how to sustain assessment and improvement operations like NILOA and other entities with similar goals. Happily, the University of Illinois has also invested in this work, ensuring that NILOA will be around for a few more years at least. And there is plenty left to do.

One of the more challenging objectives is—if possible—to reconcile the tensions between doing assessment to produce evidence of student learning in response to accountability demands and doing assessment to generate information that faculty, staff, and others can use to modify the curriculum and other learning experiences that will result in enhanced student performance. This is more than an intellectual exercise, as some faculty members view the accountability function of assessment as a threat to their autonomy, fearing that student learning outcomes results will be used to evaluate their performance and will affect their salary or other aspects of their work life. These views can dampen the enthusiasm of those faculty who are involved in assessment in their own courses and programs. Peter Ewell’s extensive writing on this topic includes a NILOA Occasional Paper (Ewell, 2009).

In addition, I worry that our efforts to demonstrate accountability are not responding in a meaningful way to what the public wants from us. A recent report sponsored by the Kettering Foundation (Johnson, Rochkind, & DuPont, 2011) concluded that, when it comes to accountability, the public has little interest in seeing dense displays of data; moreover, they know that data can be manipulated to support conflicting conclusions. Rather, what the public wants are assurances that societal institutions including colleges and universities are doing what they are funded to do and that their performance reports are understandable and trustworthy. If reclaiming the public trust is the goal, then what we present as evidence of student attainment and how we report it may have to differ from the approaches we take to communicate to internal decision makers, accreditors, and state oversight bodies.

Another major challenge that must be addressed is to create approaches that enable a campus to roll up and summarize what it knows about student performance from information collected at the program level and represent this work at the institution level. In the current environment, colleges and universities are limited in terms of what they present as evidence of student learning by posting the results from a standardized test, such as the Collegiate Learning Assessment (CLA), the Collegiate Assessment of Academic Proficiency (CAAP), and the ETS Proficiency Profile (formerly MAPP). A healthy debate is under way about the relative value of these and other standardized measures of institutional performance, especially those that purport to represent general knowledge and skills such as critical thinking and analytical reasoning. The limitations of such measures are well known. For example, many faculty members do not believe standardized tests adequately account for many of the outcomes that they and the institution are attempting to cultivate in their students or are not sensitive to certain outcomes emphasized in different major fields. Equally important, because of sampling limitations (with results from a small number of students representing the entire institution), faculty members understandably have difficulty identifying what they might do personally or as a program to improve student learning. Finally, most of the assessment work that has meaning to both students and faculty—artifacts of authentic student performance such as writing samples and other performance-based demonstrations—is collected at the program level. And it is at the program level that innovations in teaching and learning take root.

What we need is an institutional process that produces representative samples of authentic student work collected at the program level and arrays it as a summary of institutional performance. And all this must be communicated in language understandable to the layperson. We set forth some of these ideas in NILOA's evaluation of the Voluntary System of Accountability's College Profile (Jankowski et al., 2012). Time will tell if the field steps up to the challenge.

A Word About International Work

Thanks to my work on campus cultures, student engagement, and assessment, I've traveled to different parts of the world to speak and consult—Australia, China,

Germany, Lebanon, and South Africa, to name a few. Our neighbor to the north, Canada, warmed early to the student engagement premise, and institutions in every province have used NSSE. As a result, I've spoken at one or more institutions in five provinces, from Nova Scotia to British Columbia. And after some trips that were not business related, such as to Scandinavia (Kuh, 1979b) or as a trailing spouse to Japan (Kuh & Nuss, 1986), I wrote articles on some facet of the higher education system where we visited.

Colleagues who have traveled abroad know firsthand that learning about student experiences and how universities and curricula are organized and delivered makes one more sensitive to the strengths and limitations of campus life in the USA. I am grateful for these opportunities and always feel that I benefit more from spending time at a foreign university than I give in knowledge or expertise while there.

Final Reflections

I continue to be amused by faculty members who say students today are nothing like their predecessors of two or more decades ago in terms of preparation, ability, and motivation. Faculty wistfully believe that students of yesteryear were more intellectually engaged and wanted more from college than simply tickets for a comfortable life. Are such recollections accurate? It does not seem to hold for the 1940s and 1950s (Jacob, 1957). Here's what Norman Cousins wrote about undergraduates in 1960:

The distance [has seldom been greater] between the interested and the disinterested, between the intellectually curious and the routine, between the concerned and the detached.... [Some] follow national and world affairs with genuine concern; they seem to be able to distinguish between good and poor sources of information; they know how and what to read.... They seem alert, alive, responsible. But the melancholy fact is that they tend to be few in number, very few, and the drop to the others is almost precipitous.... Most ... have a mechanistic view of college. The purpose seems to be to get out of school as uneventfully and expeditiously as possible, rather than to get out of it the most that is possible.... Grades are ... purely utilitarian.... They lead to ... good jobs. (p. 22)

Taken together, these depictions coupled with the historian Fredrick Rudolph's (1990) report that first-year students at Harvard in 1890 studied on average less than 10-hours per week suggest that what college students today do and get from higher education may not be all that different from many previous cohorts. Of course, we can and should do better.

The major difference today is that the profession knows much more about effective educational practices. But the challenge remains the same: to use more of what we know works more of the time throughout the institution. In short, that's pretty much what my career has been about—identifying what makes for promising practices and helping institutions adapt them to the benefit of all students.

Woody Allen is credited for saying “80% of success is just showing up.” Herman B Wells, Indiana University’s beloved 11th president and chancellor, titled his autobiography, *Being Lucky*. No one would mistake me for either Allen or Wells, but I’ve been lucky to be in the right place at the right time in the company of many talented people. Because of them—wonderful teachers and administrators and colleagues at Luther College; challenging and supportive mentors and peers during my graduate studies at St. Cloud State University and the University of Iowa; terrific colleagues and career-friendly opportunities at Indiana University and later at the University of Illinois; inspirational administrators, faculty, and staff I’ve met at various higher education projects, meetings, and campuses; and a supportive family—because of these good people I’ve been able to do what I love for more than three decades with some measure of success.

My accomplishments are a function of devoting long hours to the work (which only on occasion seemed like “work,” especially compared to the not-infrequent 12-hour days my father drove a tractor trailer). In retrospect, I think I was advantaged by a “maze bright” ability, a concept introduced to me by my first boss and longtime friend, George Wallman, who attributed it to Eugene Jennings, professor emeritus at Michigan State University. Jennings (1971) used the term maze bright to describe people who could quickly discern the norms of organizational cultures, which he likened to a maze. I use the term here to imply I was pretty good at that—along with being able to recognize, evaluate, and then take advantage of opportunities. Surely I missed some. Even so, those that I was able to convert into productive, satisfying activities were more than I could have wished for in terms of a professorial career and fulfilling life.

Contrary to what some of my colleagues must think, I consider myself attentive to interpersonal relations and group dynamics, including those in most of the classes I took and those I taught. And I was always sensitive to the fact that I was rarely—if ever (including in the classes I taught)—the smartest person in the room. I have recently finally realized that there are benefits to not being the smartest.

First, smart people tend to talk a lot, and when they do, I can listen. And I learn a lot more when I’m listening than when I’m talking (with apologies to the eminent social psychologist, Karl Weick, who once said, “How can I know what I really think until I hear myself say it?”). Sometimes I am deliberately quiet to allow others to express their views. But much of the time in the company of really smart people, I’m not sure I have anything worthwhile to contribute. That is, until someone says exactly what I was thinking and everyone seems to think it was brilliant. Oh well....

Second, by saying little and nodding on occasion (hopefully, at the right times), I can validate others and signal that their contributions are valued. This also can have the salutary effect of encouraging the less loquacious to talk. Yes, some people—not always the smartest ones in the room—often babble on without any encouragement from anybody. But that’s another story.

Third, when I finally do say something, people are surprised and I can sense they are listening. That puts on a lot of pressure to say something meaningful. But the

ratio of meaning-to-minutes talk isn't very high generally, so others have the same problem as me—especially the big talkers!

Finally, because I've learned a lot from listening to smart people, I can go into different settings, draw on things I've heard, and sound smart myself.

It's a fact that a lot of people know more about some things than I do. It's also true that other people know at least something about more things than I do. And I've turned this realization into an advantage over the years. Early on, my *modus operandi* became surrounding myself with such smart people as I hired staff, assembled research teams, built a research center, and so forth.

There is, of course, a downside to hanging out with highly intelligent, skilled people. It's called intimidation, which can morph into the imposter syndrome—the sensation that everyone else present belongs; they know their stuff and were invited because of what they know or can do. They are a perfect fit for the task at hand. I, however, am a misfit. And I worry that when someone finds out I don't belong, I will be unceremoniously excused.... A nightmare!

The imposter syndrome is not unique to me, of course. Others have talked and written about it. One such circumstance from my professional life is enough to make the point. Recall that NSSE was one of the big ideas that Russ Edgerton had when he was the Pew education officer. Russ also subsequently chaired the NSSE board. I hung on Russ's every word in every conversation. In return, I felt he was always listening closely to every word I said—but in an evaluative manner. It was as if I was under the looking glass every time I spoke. There's more to say about this, of course—lots of examples. But a funny thing happened recently. I was with a person who worked with Russ many years earlier. As we reminisced about Russ and his imposing intellect and interpersonal style, she said something most surprising. She said Russ once told her that he always felt that everyone in the room was smarter than he was—much smarter. Wow! Imagine that!

Russ kindly gave me permission to tell this story on him so I could finally put to rest the worry that not being the smartest person in the room is a problem. And I must say, even though I didn't always understand the potential benefits of being surrounded by people smarter than I, it has been a definite career advantage.

References

- American College Personnel Association. (1994). *The student learning imperative: Implications for student affairs*. Washington, DC: Author. Retrieved from www.acpa.nche.edu/sli/sli.htm
- American College Personnel Association, & National Association of Student Personnel Administrators. (2004). *Learning reconsidered: A campus-wide focus on the student experience*. Washington, DC: Authors. Retrieved from www.naspa.org and www.acpa.nche.edu
- American Council on Education. (1937, June). *The student personnel point of view* (A report of a conference on the philosophy and development of student personnel work in college and university). Washington, DC: Author.
- Association of American Colleges and Universities. (2007). *College learning for the new global century* (A report from the National Leadership Council for Liberal Education & America's Promise). Washington, DC: Author.

- Astin, A. W. (1977). *Four critical years*. San Francisco: Jossey-Bass.
- Astin, A. W. (1993). *What matters in college: Four critical years revisited*. San Francisco: Jossey-Bass.
- Baldrige, J. V. (1981, June). Higher education's jugular vein decisions. *AAHE Bulletin*, 33 (1ff).
- Blaich, C. F. (2009, May/June). *High-impact practices and experiences from the Wabash National Study*. Closing plenary address at the AAC&U Institute on General Education and Assessment, Minneapolis, MN.
- Bridges, B. K., Cambridge, B., Kuh, G. D., & Leegwater, L. H. (2005). Student engagement at minority serving institutions: Emerging lessons from the BEAMS project. In G. H. Gaither (Ed.), *What works: Achieving success in minority retention. New Directions for Institutional Research*, 2003(125), 25–43.
- Brownell, J. E., & Swaner, L. E. (2010). *High-impact educational practices: Do they live up to their name?* Washington, DC: Association of American Colleges and Universities.
- Chickering, A. W., & Gamson, Z. F. (1987, March). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, 39(7), 3–7.
- Clark, B., Heist, P., McConnell, M., Trow, M., & Yonge, G. (1972). *Students and colleges: Interaction and change*. Berkeley, CA: University of California, Center for Research and Development in Higher Education.
- Cousins, N. (1960, April 30). Stroll on the American campus. *Saturday Review*, 43(18), 22.
- Cruce, T., Wolniak, G. C., Seifert, T. A., & Pascarella, E. T. (2006). Impacts of good practices on cognitive development, learning orientations, and graduate degree plans during the first year of college. *Journal of College Student Development*, 47, 365–383.
- Dannells, M., & Kuh, G. D. (1977). Orientation. In W. T. Packwood (Ed.), *College student personnel services* (pp. 102–124). Springfield, IL: Thomas.
- Ewell, P. T. (2009, November). *Assessment, accountability, and improvement: Revisiting the tension* (NILOA Occasional Paper, No. 1). Urbana, IL: University of Illinois and Indiana University, National Institute for Learning Outcomes Assessment.
- Hossler, D., Kuh, G. D., & Olsen, D. (2001a). Finding fruit on the vines: Using higher education research and institutional research to guide institutional policies and strategies (Part I). *Research in Higher Education*, 42(2), 211–221.
- Hossler, D., Kuh, G. D., & Olsen, D. (2001b). Finding (more) fruit on the vines: Using higher education research and institutional research to guide institutional policies and strategies (Part II). *Research in Higher Education*, 42(2), 223–235.
- Jacob, P. (1957). *Changing values in college*. New York: Harper & Row.
- Jankowski, N. A., Ikenberry, S. O., Kinzie, J., Kuh, G. D., Shenoy, G. F., & Baker, G. R. (2012, March). *Transparency & accountability: An evaluation of the VSA College Portrait pilot*. Urbana, IL: University of Illinois and Indiana University, National Institute for Learning Outcomes Assessment (NILOA).
- Jennings, E. E. (1971). *Routes to the executive suite*. New York: McGraw-Hill.
- Johnson, J., Rochkind, J., & DuPont, S. (2011). *Don't count us out: How an overreliance on accountability could undermine the public's confidence in schools, business, government, and more*. Dayton, OH: Kettering Foundation and Public Agenda.
- Keeling, R. (Ed.) (2006). *Learning reconsidered 2: Implementing a campus-wide focus on the student experience*. Washington, DC: American College Personnel Association, National Association of Student Personnel Administrators, and other organizations. Retrieved from www.myacpa.org/pub/documents/LearningReconsidered2.pdf
- Kinzie, J., Magolda, P., Kezar, A., Kuh, G., Hinkle, S., & Whitt, E. (2006, June 3). Methodological challenges and tensions in multi-investigator multi-institutional research. *Higher Education*, 2007(54), 469–482. doi: 10.1007/s10734-006-9007-7. Retrieved from <http://www.springerlink.com/content/5757077807241524/fulltext.pdf>
- Kuh, G. D. (1975). The importance of grades in selecting educational personnel. *Journal of the Student Personnel Association for Teacher Education*, 12, 151–156.
- Kuh, G. D. (1976). Persistence of the impact of college on attitudes and values. *Journal of College Student Personnel*, 17, 116–122.

- Kuh, G. D. (1977a). Admissions. In W. T. Packwood (Ed.), *College student personnel services* (pp. 3–50). Springfield, IL: Thomas.
- Kuh, G. D. (1977b). Factors associated with post-college changes in personality characteristics. *Journal of College Student Personnel*, 18, 363–370.
- Kuh, G. D. (Ed.). (1979a). *Evaluation in student affairs*. Cincinnati, OH: American College Personnel Association.
- Kuh, G. D. (1979b). Student unions: The Scandinavian counterpart to American university student services. *Journal of the National Association of Women Deans, Administrators, and Counselors*, 42(4), 3–9.
- Kuh, G. D. (1981). *Indices of quality in the undergraduate experience* (AAHE-ERIC/Higher Education Research Report, No. 4). Washington, DC: American Association for Higher Education.
- Kuh, G. D. (2001). Assessing what really matters to student learning: Inside the national survey of student engagement. *Change*, 33(3), 10–17, 66.
- Kuh, G. D. (2003). What we're learning about student engagement from NSSE. *Change*, 35(2), 24–32.
- Kuh, G. D. (2008). *High-impact educational practices: What they are, who has access to them, and why they matter*. Washington, DC: Association of American Colleges and Universities.
- Kuh, G. D. (2009, Spring). The National Survey of Student Engagement: Conceptual and empirical foundations. In R. M. Gonyea & G. D. Kuh (Eds.), Using NSSE in institutional research. *New Directions for Institutional Research*, 2009(141), 5–20.
- Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects of student engagement on college grades and persistence. *Journal of Higher Education*, 79, 540–563.
- Kuh, G. D., Kinzie, J., Buckley, J. A., Bridges, B. K., & Hayek, J. C. (2007). *Piecing together the student success puzzle: Research, propositions, and recommendations* (ASHE Higher Education Report, Vol. 31, No. 3). San Francisco, CA: Jossey-Bass.
- Kuh, G. D., Kinzie, J., Schuh, J. H., & Whitt, E. J. (2011). Fostering student success in hard times. *Change*, 43(4), 13–19.
- Kuh, G. D., Kinzie, J., Schuh, J. H., Whitt, E. J., & Associates. (2005). *Student success in college: Creating conditions that matter*. San Francisco: Jossey-Bass.
- Kuh, G. D., Kinzie, J., Schuh, J. H., Whitt, E. J., & Associates. (2010). *Student success in college: Creating conditions that matter* (new preface and epilogue). San Francisco: Jossey-Bass.
- Kuh, G. D., & Nuss, E. M. (1986). Student affairs work in Japanese colleges and universities. *National Association of Student Personnel Administrators Journal*, 23(3), 39–49.
- Kuh, G. D., & Pascarella, E. T. (2004). What does institutional selectivity tell us about educational quality? *Change*, 36(5), 52–58.
- Kuh, G. D., Redding, A. J., & Lesar, D. J. (1972). Counseling the transfer: Does it make a difference? *Journal of the National Association of College Admissions Counselors*, 16(4), 16–19.
- Kuh, G. D., Schuh, J. H., Whitt, E. J., & Associates. (1991). *Involving colleges: Successful approaches to fostering student learning and personal development outside the classroom*. San Francisco: Jossey-Bass.
- Kuh, G. D., & Soule, D. J. (1975). Toward more effective communication. *American Dental Assistant Association Journal*, 44, 31–32.
- Kuh, G. D., & Whitt, E. J. (1988). *The invisible tapestry: Culture in American colleges and universities* (ASHE-ERIC Higher Education Report, No. 1). Washington, DC: Association for the Study of Higher Education.
- Kuh, G., & Ikenberry, S. (2009). *More than you think, less than we need: Learning outcomes assessment in American higher education*. Urbana, IL: University of Illinois and Indiana University, National Institute for Learning Outcomes Assessment. Retrieved from <http://learningoutcomesassessment.org/MoreThanYouThink.htm>
- McCarthy, M. M., & Kuh, G. D. (1997). *Continuity and change: The educational leadership professoriate*. Columbia, MO: University Council on Educational Administration.

- McCarthy, M. M., Kuh, G. D., Newell, L. J., & Iacona, C. (1988). *Under scrutiny: The educational administration professoriate*. Tempe, AZ: University Council on Educational Administration.
- National Association of State Universities and Land-Grant Colleges. (1997). *Returning to our roots: The student experience*. Washington, DC: Author. Retrieved from www.nasulgc.org/publications/publications.asp#Publications
- National Association of Student Personnel Administrators. (1987). *A perspective on student affairs*. Washington, DC: Author.
- National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform* (A report to the nation and the Secretary of Education, United States Department of Education), Washington, DC. Retrieved from www.ed.gov/pubs/NatAtRisk/index.html
- National Institute of Education. (1984). *Involvement in learning: Realizing the potential of American higher education* (Final report of the Study Group on the Conditions of Excellence in American Higher Education). Washington, DC: Author.
- Newell, L. J., & Kuh, G. D. (1989). Taking stock: The higher education professoriate. *The Review of Higher Education*, 13, 63–90.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: Vol. 2. A third decade of research*. San Francisco: Jossey-Bass.
- Peters, T. (1987). *Thriving on chaos: Handbook for a management revolution*. New York: Knopf.
- Rudolph, F. (1990). *The American college and university: A history*. Athens, GA: University of Georgia Press.
- Sanford, N. (Ed.). (1962). *The American college: A psychological and social interpretation of the higher learning*. New York: Wiley.
- Tavris, C. (1974). "What does college do for a person?" "Frankly, very little": A conversation with Theodore Newcomb. *Psychology Today*, 8(4), 72–74.
- Tinto, V. (1987). *Leaving college: Rethinking the causes and cures of student attrition*. Chicago: University of Chicago Press.
- Tinto, V. (2012). *Completing college: Rethinking institutional action*. Chicago: University of Chicago Press.
- Tyson, W. (2012). *Pitch perfect: Communicating with traditional and social media for scholars, researchers, and academic leaders*. Sterling, VA: Stylus.
- Wingspread Group on Higher Education. (1993). *An American imperative: Higher expectations for higher education*. Racine, WI: Johnson Foundation.

Chapter 2

Student Engagement: Bridging Research and Practice to Improve the Quality of Undergraduate Education

Alexander C. McCormick, Jillian Kinzie, and Robert M. Gonyea

Introduction

Engagement is in vogue. The term has proliferated widely in higher education, with civic engagement, community engagement, scholarship of engagement, and student engagement peppering the discourse. It has even penetrated the upper reaches of the organizational chart, with vice presidents, vice provosts, associate or assistant vice presidents and provosts, deans, and directors variously responsible for “engagement,” “community engagement,” “student engagement,” and so on. But these various invocations of the term mean different things. Whereas civic and community engagement focus on the various ways that colleges and universities develop students’ dispositions toward civic participation and advance the welfare of their surrounding communities (Bringle, Games, & Malloy, 1999; Saltmarsh & Hartley, 2011; Zlotkowski, 1997), student engagement refers to college students’ exposure to and participation in a constellation of effective educational practices at colleges and universities (which may include practices that advance the civic and community engagement mission, such as service learning).¹ This chapter focuses on student engagement as a research-informed intervention to improve the quality of undergraduate education. We trace the emergence of the concept and its intellectual history; review measurement issues, empirical applications, and representative research findings; and provide illustrations of how student engagement connects to contemporary imperatives surrounding assessment and evidence-based improvement. We conclude with a discussion of challenges for student engagement and an assessment of what lies ahead for student engagement research and application.

A.C. McCormick, Ph.D. (✉) • J. Kinzie, Ph.D. • R.M. Gonyea, Ed.D.
Center for Postsecondary Research, Indiana University, 1900 E. 10th Street,
Suite 419, Bloomington, IN, USA 47406
e-mail: amcc@indiana.edu; jikinzie@indiana.edu; rgonyea@indiana.edu

Although the term student engagement is new to higher education, having emerged in the late 1990s, the ideas that it encompasses have been around for several decades. Before tracing this background, it's useful to consider the context in which student engagement emerged as a framework for understanding, diagnosing, and improving the quality and effectiveness of undergraduate education. This is a story of the confluence of two streams: one involving increasing interest in so-called process indicators and the other related to mounting frustration with the dominant conception of college and university quality in the United States. This background is closely intertwined with the development of the National Survey of Student Engagement (NSSE) and its counterpart, the Community College Survey of Student Engagement (CCSSE).

National Education Goals and the Use of “Process Indicators”

In 1989, President George H. W. Bush and the governors of the 50 states articulated a set of National Education Goals. The subsequent work of the National Education Goals Panel culminated in the Goals 2000: Educate America Act, signed into law by President Bill Clinton in 1994. The legislation set forth eight goals for American education to achieve by the year 2000. Although most of the goals focused on elementary and secondary education, the goal related to adult literacy and lifelong learning specified that “the proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems will increase substantially.” The sustained discussion of national goals created the need to monitor progress toward their achievement. As related by Peter Ewell (2010) in his account of NSSE's origins, “The implied promise to develop the metrics needed to track progress on these elusive qualities... stimulated thinking about how to examine them *indirectly* by looking at what institutions did to promote them” (p. 86). Ewell and his colleagues at the National Center for Higher Education Management Systems (NCHEMS) produced a series of articles and reports proposing how “indicators of good practice” or “process indicators” might be productively deployed without the long delay and expense required to develop direct assessments of the outcomes set forth in the national goals (though they also endorsed the development of such assessments) (Ewell & Jones, 1993, 1996; National Center for Higher Education Management Systems [NCHEMS], 1994). Ewell and Jones (1993) also articulated the virtue of process measures for contextualizing what is learned from outcomes assessments, noting that “it makes little policy sense to collect outcomes information in the absence of information on key processes that are presumed to contribute to the result” (p. 125). Indeed, citing Astin's (1991) work on assessment in higher education, they asserted that “information on outcomes alone is virtually uninterpretable in the absence of information about key experiences” (p. 126). They suggested that process indicators related to good practices in undergraduate education have practical relevance, because their linkage to concrete activities offers guidance for interventions to promote improvement. In a report for the National Center for Education Statistics

on the feasibility of “good practice” indicators for undergraduate education, the NCHEMS team undertook a comprehensive review of the knowledge base and available information sources (NCHEMS, 1994). In the discussion of available surveys of current students, the Cooperative Institutional Research Program (CIRP) surveys and the College Student Experiences Questionnaire (CSEQ) were identified as bearing on a number of dimensions of “instructional good practice.”²

Kuh, Pace and Vesper (1997) implemented the process indicator approach using CSEQ data from a diverse sample of institutions and students. They created indicators to tap three of Chickering and Gamson’s (1987) seven “principles for good practice in undergraduate education” (student-faculty contact, cooperation among students, and active learning) and examined their relationship to students’ self-reported learning gains in general education, intellectual skills, and personal and social development. The researchers concluded that CSEQ items could be combined to produce indicators of good practice in undergraduate education and that these indicators showed positive and consistent relationships to self-reported learning outcomes. Although the term “student engagement” did not appear in the article, it offered proof of concept of the process indicator approach and foreshadowed the development of a survey designed explicitly to provide process measures related to good practice in undergraduate education.

Discontent with the National Discourse on College Quality

The other stream contributing to the emergence of student engagement as a framework for assessing educational quality emerged from mounting discontent over the dominant conception of “college quality” in the national mind-set. Beginning in the 1980s, the news magazine *U.S. News & World Report* began publishing annual lists that purported to identify “America’s Best Colleges” through a numeric ranking. Although the rankings received extensive criticism from both inside and outside the academy, they proved popular with the general public and, it is widely believed, provided an important source of revenue for the magazine (McDonough, Antonio, Walpole, & Perez, 1998).³ They also received the implied endorsement of highly ranked colleges and universities that boasted of their standing in their recruitment and promotional materials. (This number was larger than one might expect because the magazine’s editors shrewdly split the rankings into subgroups, such that each *Best Colleges* issue provided multiple lists and multiple high performers—in “national” universities and liberal arts colleges, eight regional rankings, separate rankings for public universities, “best value” rankings, and so on.)

While the rankings have been subject to a variety of philosophical and methodological objections (e.g., see Gladwell, 2011; Graham & Thompson, 2001; Machung, 1998; Thacker, 2008; Thompson, 2000), an enduring complaint has been their emphasis on reputation and input measures to the exclusion of any serious treatment of teaching and learning. Indeed, the first issue of the rankings was based solely on a reputation survey sent to college and university presidents, and when the rankings

methodology was later expanded to include other criteria, it was specifically engineered to reproduce the conventional wisdom that the most elite institutions are, in fact, the best (Thompson, 2000). If the rankings were no more than an innocent parlor game, their shortcomings would not have raised much concern. But repeated reports of strategic action by institutional personnel to influence their placement⁴ raised serious concerns about the rankings' indirect influence on matters of institutional policy and resource allocation (Ehrenberg, 2002).

To be sure, *U.S. News* was not alone in motivating perverse choices in the pursuit of higher ranking and prestige. Rankings and classifications based on research activity have been another source of status competition that can lead administrators to allocate more resources to schools and departments that bring in high-dollar-value grants and contracts. But *U.S. News* was the self-proclaimed national arbiter of college quality, and its ranking criteria explicitly rewarded a narrow, wealth- and selectivity-based conception of quality that gave short shrift to teaching and learning. All of this occurred at a time when US higher education was confronting a range of serious challenges: the price of four-year college attendance had been steadily rising faster than the rate of inflation, as federal financial aid programs came to rely more heavily on loans than grants; states were shifting proportionally more of the cost of public higher education to students and families; colleges and universities were engaged in an array of costly tactics to enroll the most desirable students, such as differential pricing (tuition discounting) and the so-called war of amenities; and college completion rates were stagnant at less than 60%.

It was in this context that the Pew Charitable Trusts undertook to fund the development and implementation of a survey project focused on process indicators related to educational effectiveness at bachelor's degree-granting colleges and universities and subsequently at community colleges.⁵ A fundamental design principle was that the survey would be heavily focused on behavioral and environmental factors shown by prior research to be related to desired college outcomes. About two-thirds of the original survey's questions were drawn or adapted from the CSEQ (Kuh, 2009).

NSSE's founding director, George Kuh, promoted the concept of student engagement as an important factor in student success and thus a more legitimate indicator of educational quality than rankings based on inputs and reputation. He described student engagement as a family of constructs that measure the time and energy students devote to educationally purposeful activities—activities that matter to learning and student success (Kuh, n.d.). From the outset, then, student engagement was closely tied to purposes of institutional diagnosis and improvement, as well as the broader purpose of reframing the public understanding of college quality. But it was also explicitly linked to a long tradition of prior theory and research, as we describe in the next section. Thus the concept of student engagement and the two university-based research and service projects organized around it, NSSE and CCSSE, represent an attempt to bridge the worlds of academic research and professional practice—to bring long-standing conceptual and empirical work on college student learning and development to bear on urgent practical matters of higher education assessment and improvement. We now turn to the intellectual heritage of student engagement.

The Conceptual Lineage of Student Engagement

Student engagement is not a unitary construct. Rather, it is an umbrella term for a family of ideas rooted in research on college students and how their college experiences affect their learning and development. It includes both the extent to which students participate in educationally effective activities as well as their perceptions of facets of the institutional environment that support their learning and development (Kuh, 2001, 2009). Central to the conceptualization of engagement is its focus on activities and experiences that have been empirically linked to desired college outcomes. These influences go back to the 1930s and span the fields of psychology, sociology, cognitive development, and learning theory, as well as a long tradition of college impact research. The concept also incorporates contributions from the field, in the form of practical evaluations of the college environment and the quality of student learning, pressure for institutions to be accountable for and to assess educational quality, concerns about student persistence and attainment, and the scholarship of teaching and learning.

The historical roots of student engagement can be traced to studies in the 1930s by educational psychologist Ralph Tyler, who explored the relationship between secondary school curriculum requirements and subsequent college success. At The Ohio State University, Tyler was tasked with assisting faculty in improving their teaching and increasing student retention, and as part of this work, he designed a number of path-breaking “service studies” including a report on how much time students spent on their academic work and its effects on learning (Merwin, 1969). Joining C. Robert Pace and other noted scholars, Tyler contributed his expertise in educational evaluation and the study of higher education environments to the Social Science Research Council’s Committee on Personality Development in Youth (1957–1963), which furthered the study of college outcomes by turning attention to the total college environment. The committee concluded that outcomes do not result from courses exclusively, but rather from the full panoply of college life (Pace, 1998). This focus on both student and environmental factors related to college success became an important area of study for Pace, who went on to develop a number of questionnaires for students to report on the college environment. Pace’s studies of college environments documented the influence of student and academic subcultures, programs, policies, and facilities, among other factors, and how they vary among colleges and universities.

Tyler’s early work showing the positive effects on learning of time on task was explored more fully by Pace (1980) who showed that the “quality of effort” students invest in taking advantage of the facilities and opportunities a college provides is a central factor accounting for student success. He argued that because education is both process and product, it is important to measure the quality of the processes, and he used the term quality of effort to emphasize the importance of student agency in producing educational outcomes. In recollecting the development of these ideas, he wrote:

We have typically thought of educational processes in terms of what they contribute to the product; but we know that some processes are qualitatively better than others, just as some products are better than others, so perhaps we should give more thought to measuring the

quality of the processes. One motivation for my desire to measure student effort was the recurring rhetoric about accountability that always blamed the institution for outcomes... This assumes that the student is buying a product when actually the student, at a later point in time, is the product. So, the other side of accountability is the quality of effort students invest in using the facilities and opportunities the college provides. (Pace, 1998, p. 28)

Pace's instrument, the CSEQ, was created with substantial conceptual backing to operationalize "student effort," defined as a straightforward measure of facility use so that students "would immediately know whether they had engaged in the activity and about how often" (Pace, 1998, p. 29). The quality of effort construct rested on the assertion that the more a student is meaningfully engaged in an academic task, the more he or she will learn. Pace found that students gained more from their college experience when they invested more time and effort in educationally purposeful tasks such as studying, interacting with peers and faculty about substantive matters, and applying what they are learning to concrete situations. Importantly, he distinguished quality of effort from motivation, initiative, or persistence. Although it incorporates these elements, it takes place within a specific educational context, and its strength depends on the context.

Student engagement is also rooted in the work of Alexander Astin (1984) who articulated a developmental theory for college students focused on the concept of involvement, or "the amount of physical and psychological energy that the student devotes to the academic experience" (p. 297), and that what students gain from the college experience is proportional to their involvement. This involvement can be academic, social, or extracurricular. Astin hypothesized that the more involved the student is, the more successful he or she will be in college. He acknowledged that the concept of involvement resembles that of motivation, but distinguished between the two, arguing that motivation is a psychological state while involvement connotes behavior. These key ideas of time on task, quality of effort, and involvement all contribute to the conceptualization of student engagement.

Both Pace (1969, 1980) and Astin (1970, 1984) emphasized the important role of the college environment and what the institution does or fails to do to in relation to student effort and involvement. In contrast to models of college impact that viewed the student as a passive subject, Pace (1964, 1982) conceived of the student as an active participant in his or her own learning and that one of the most important determinants of student success is the active participation of the student by taking advantage of a campus's educational resources and opportunities. Pace (1998) characterized his work as an examination of relationships in their "natural setting," between environments and attainment, effort and outcomes, and patterns of college students' activities and institutional influences. Astin (1984) further articulated the vital role of the institution, in stating that the "effectiveness of any educational practice is directly related to the capacity of that policy or practice to increase involvement" (p. 298).

Another root in the student engagement family tree is Tinto's concept of integration. The term integration refers to the extent to which a student (a) comes to share the attitudes and beliefs of peers and faculty and (b) adheres to the structural rules and requirements of the institution (Pascarella & Terenzini, 1991; Tinto,

1975, 1993). Tinto (1975, 1993) proposed his theory of academic and social integration to explain voluntary student departure from an institution. He defined integration with regard to a student's social and academic connection to the campus. Social integration refers to a student's perceptions of interactions with peers, faculty, and staff at the institution as well as involvement in extracurricular activities. Academic integration refers to a student's academic performance, compliance with explicit standards of the college or university, and identification with academic norms. Tinto's was one of the first theories that viewed voluntary departure as involving not just the student but also the institution. Described as an "interactionist" theory because it considers both the person and the institution, Tinto (1986) shifted responsibility for attrition from resting solely with the individual student and his or her personal situation to include institutional influences. Informed by Tinto's work, student engagement incorporates a student's interactions with peers and faculty and the extent to which the student makes use of academic resources and feels supported at the institution.

Pascarella's (1985) "general causal model for assessing the effects of differential college environments on student learning and cognitive development," or more simply, the general causal model, expanded on Tinto's work by incorporating institutional characteristics and quality of student effort and by linking to more outcomes than retention. Pascarella theorized that students' precollege traits correlate with institutional types and that both of these influence the institutional environment and interactions with agents of socialization, such as faculty members, key administrators, and peers. Pascarella also acknowledged that student background has a direct effect on learning and cognitive development, beyond the intervening variables. By including quality of student effort, Pascarella affirmed Pace's (1984) notion that students' active participation in their learning and development is vital to learning outcomes. Pascarella viewed quality of effort as influenced by student background and precollege traits, by the institutional environment, and by interactions with agents of socialization. Tinto's and Pascarella's emphases on students' interactions with their institution and on institutional values, norms, and behaviors provide the basis for the environmental dimensions of student engagement.

Both Astin's (1985) input-environment-output model, or I-E-O model, and Pascarella's general causal model have been used in student engagement research (see Pike, 1999, 2000; Pike & Killian, 2001; Pike, Kuh, & Gonyea, 2007). Pike and Kuh (2005a) employed elements of Astin's I-E-O model of college effects and Pascarella's causal model as conceptual frames to examine how the college experiences of first- and second-generation college students affect their learning and intellectual development.

In *The Impact of College on Students* (1969), Feldman and Newcomb synthesized some four decades of findings from more than 1,500 studies of the influence of college on students. Subsequent reviews by Bowen (1977), Pace (1979), and Pascarella and Terenzini (1991, 2005) synthesized research on college students and collegiate institutions from the mid-1920s to the early twenty-first century. One unequivocal conclusion, wholly consistent with Pace's and Astin's work, is that the impact of college on learning and development is largely determined by individuals' quality of

effort and level of involvement in both the curricular and cocurricular offerings on a campus. Rather than being mere passive recipients of college environmental effects, students share responsibility for the impact of their own college experience.

The literature on effective teaching and learning also contributes to the conceptualization of student engagement. In setting forth a set of principles of good practice in undergraduate education, Chickering and Gamson (1987) provided a concise summary of 50 years of educational research about teaching and learning activities most likely to contribute to learning outcomes. This concise piece—only four pages of text—has had a notable impact on how educational effectiveness is understood and promoted in higher education. In a footnote, the authors acknowledge the assistance of a virtual Who's Who of higher education research and policy, including Alexander Astin, Howard Bowen, Patricia Cross, Kenneth Eble, Russell Edgerton, Jerry Gaff, C. Robert Pace, and Marvin Peterson. Chickering and Gamson distilled the research into seven lessons for good teaching and learning in colleges and universities, including (1) student-faculty contact, (2) cooperation among students, (3) active learning, (4) providing prompt feedback, (5) emphasizing time on task, (6) communicating high expectations, and (7) respecting diverse talents and ways of learning. Chickering and Gamson's commonsense principles were intended to guide faculty members, administrators, and students, with support from state agencies and trustees, in their efforts to improve teaching and learning. They argued that while each practice can stand alone, when all are present their effects multiply, and that combined, they can exert a powerful force in undergraduate education. They also asserted the responsibility of educators and college and university leaders to foster an environment favorable to good practice in higher education. The principles emphasize the responsibility of leaders and educators to ensure that students engage routinely in high levels of effective educational practice. Multivariate longitudinal analyses of these practices at a diverse group of 18 institutions have shown them to be related to cognitive development and several other positive outcomes, net of a host of control variables (Cruce, Wolniak, Seifert, & Pascarella, 2006).

Similarly, as part of their comprehensive reviews of research on college impact, Pascarella and Terenzini (1991, 2005) concluded that a range of pedagogical and programmatic interventions such as peer teaching, note-taking, active discussion, integration across courses, and effective teaching practices increase students' engagement in learning and academic work and thereby enhance their learning and development. In *How College Affects Students* (1991), the authors concluded that "the greater the student's involvement or engagement in academic work or in the academic experience of college, the greater his or her level of knowledge acquisition and general cognitive development" (p. 616).

Recent Developments

More recently, participation in "high-impact practices," activities such as learning communities, undergraduate research, and service learning, has proven to be a promising way to promote student engagement and help students achieve the learning

and personal development outcomes essential for the twenty-first century (Association of American Colleges and Universities [AAC&U], 2007; Kuh, 2008). High-impact practices make a claim on students' time and energy, in ways that may require close interaction with faculty or diverse others and that call upon students to apply their learning in novel situations, and they are correlated with deep approaches to learning (NSSE, 2007). Providing students with opportunities to apply and test what they are learning through problem solving with peers inside and outside the classroom, study abroad, internships, and capstone experiences helps students develop habits of the mind and heart that promise to stand them in good stead for a lifetime of continuous learning. For instance, Zhao and Kuh (2004) show that students who participated in a learning community were more engaged across the board in other educationally purposeful activities compared with their counterparts who had not participated in such a program. They interacted more with faculty and diverse peers, they studied more, and they reported a stronger emphasis in courses on higher-order cognitive activities such as synthesizing material and analyzing problems. They also reported gaining more from their college experience.

Over the last decade, educators have contributed to the understanding of student engagement from a pedagogical standpoint. For example, Barkley (2010) developed a classroom-based model for understanding student engagement that emphasizes engagement as both a process and product of the interaction between motivation and active learning. Scholars such as Kathleen Gabriel (2008) have explicated the value of engagement for teaching underprepared students. Other teaching and learning research (e.g., Ahlfeldt, Mehta, & Sellnow, 2005; Smith, Sheppard, Johnson, & Johnson, 2005) explored classroom-based pedagogies of engagement, particularly cooperative- and problem-based learning that enhance student involvement in learning, and urged faculty to consider how students engage in their college experience in both formal and informal ways. These examples of the intersection of the scholarship of teaching and learning with student engagement demonstrate the connection of student engagement to educational practice, as well as a commitment to improvement driven by classroom-based evidence and insights.

From the perspective of involvement, quality of effort, academic and social integration, as well as principles of good practice in undergraduate education, student engagement can be seen as encompassing the choices and commitments of students, of individual faculty members, and of entire institutions (or schools and colleges within larger decentralized institutions). Students' choices include their quality of effort and their involvement in educational experiences and activities (both inside and outside of class). They choose among courses or course sections, and they also make choices within their courses. In choosing courses, they may consider not just the course content, schedule, and what they know about the instructor but also the amount and type of work required. Once enrolled, they make decisions about how to allocate their effort. Students also make choices about whether and how to associate with their fellow students, be it through formal cocurricular activities or informally. The relevant choices and commitments of faculty and institutions, on the other hand, relate primarily to the principles for good practice in undergraduate education. Faculty members choose the learning activities and opportunities in their

courses, they convey their expectations to students, they decide on the nature and timing of feedback provided to students, they facilitate student learning outside of class through formal and informal means, and so on. Institutional leaders and staff establish norms and allocate resources to support student success. For example, library and student affairs professionals create supportive learning environments and provide programs, speakers, and events that enrich the undergraduate experience. Through their policies and practices, institutional leaders communicate shared norms and standards for students, faculty, and staff with regard to student challenge and support.

The intellectual heritage reviewed in this section establishes the conceptual understanding of college impact that undergirds student engagement as an agenda for both promoting student success and enriching the impoverished national discourse on college quality. It also demonstrates the linkage between student engagement and the world of practice, thereby connecting to contemporary reform movements such as the scholarship of teaching and learning. If individual effort is critical to learning and development, then it is essential for colleges and universities to shape experiences and environments so as to promote increased student involvement.

Measuring Student Engagement

From a conceptual standpoint, student engagement represents the blending of related theoretical traditions seeking to explain college students' learning, development, and success with a set of practical prescriptions for good practice in undergraduate education. The *measurement* of student engagement is rooted in both a long tradition of survey research in higher education and more recent calls for process indicators to assess progress toward national goals for undergraduate education. In this section, we discuss the measurement of student engagement by shifting the focus to two widely adopted surveys designed to assess college-level student engagement, the National Survey of Student Engagement and the Community College Survey of Student Engagement.

As the Director of Education for the Pew Charitable Trusts, Russ Edgerton (1997) proposed a grant project to improve higher education, focused on the belief that *what* students learn is affected by *how* they learn. Edgerton argued for “new pedagogies of engagement” to help students acquire the abilities and skills for the twenty-first century. Launched in 2000 with support from the Pew Trusts, NSSE is administered in the spring as either a sample- or census-based survey of first-year and senior students. With support from both the Pew Trusts and the Lumina Foundation, CCSSE was adapted from NSSE in 2001 to address the distinctive features and needs of community colleges and their students while preserving appropriate parallelism (Community College Survey of Student Engagement [CCSSE], 2010a, 2010b). Like NSSE, CCSSE is administered in the spring, but without limitation on a student's year in school, instead collecting information about the number of credit hours earned by each respondent.

Surveys provide a cost-effective way to learn directly from students about their experiences. But survey research confronts a number of challenges. First, respondents must elect to participate. Response rates represent an ongoing concern. As colleges and universities respond to calls to establish a “culture of evidence,” students are increasingly asked to participate in a variety of surveys and standardized learning assessments. The advent of inexpensive and easy-to-use online survey tools effectively allows anyone to survey students, adding to the survey burden. Consequently, survey response rates are falling: NSSE’s average institutional response rate has fallen by about 10 points since inception.

Having chosen to complete a survey, respondents must make a good-faith effort to respond with honesty and candor. Respondents need to understand the question being asked in a way that aligns with the survey designer’s intent, to retrieve and process the information required to formulate an answer, and, in the case of a closed-ended survey like NSSE or CCSSE, to convert the answer to fit within the response frame (Tourangeau, Rips, & Rasinski, 2000). Citing prior research on self-reported data, Kuh et al. (2001) identify five conditions as conducive to the validity of self-reports, noting that the NSSE instrument was designed to meet them. The five conditions are the following:

- (1) the information requested is known to the respondents; (2) the questions are phrased clearly and unambiguously; (3) the questions refer to recent activities; (4) the respondents think the questions merit a serious and thoughtful response; and (5) answering the questions does not threaten, embarrass, or violate the privacy of the respondent or encourage the respondent to respond in socially desirable ways. (p. 9)

Survey Content

Student engagement incorporates both behavioral and perceptual components. The behavioral dimension includes how students use their time in- and outside of class (e.g., asking questions, collaborating with peers in learning activities, integrating ideas across courses, reading and writing, interacting with faculty) as well as how faculty members structure learning opportunities and provide feedback to students. Because beliefs and attitudes are antecedents to behavior (Bean & Eaton, 2000), perceptions of the campus environment are a critical piece in assessing a student’s receptivity to learning. The perceptual dimension thus includes students’ judgments about their relationships with peers, faculty, and staff; their beliefs that faculty members have high expectations of students; and their understanding of institutional norms surrounding academic activities and support for student success. Both dimensions were incorporated in the design of the NSSE and CCSSE surveys (Fig. 2.1). A key criterion in NSSE’s design (and subsequently, that of CCSSE) was that the survey content would be selected based on prior empirical evidence of a relationship to student learning and development—research emerging from the conceptual traditions previously discussed (Ewell, 2010).⁶

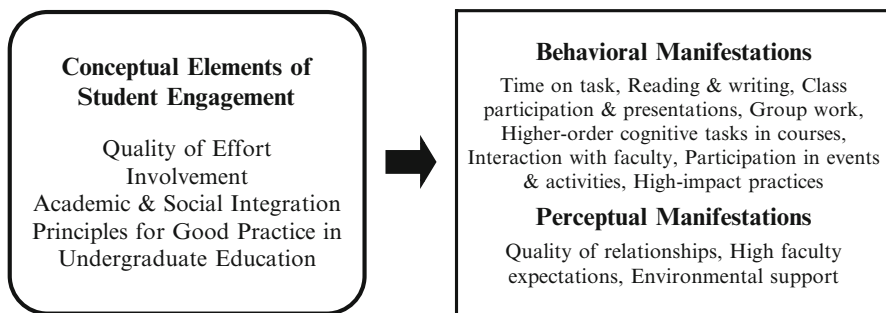


Fig. 2.1 Conceptual elements of student engagement and selected manifestations

Because of their strong emphasis on student *behavior*, surveys of student engagement differ markedly from widely used surveys of college students that examine their values and attitudes or their satisfaction with the college experience. The focus on behavior is both concrete and actionable: when results fall short of what is desired, the behavioral measures suggest avenues of intervention. For illustration purposes, Table 2.1 presents selected NSSE questions assessing active and collaborative learning activities, prompt feedback from faculty, faculty expectations, amount of reading and writing, time devoted to class preparation, quality of campus relationships, and perceived institutional emphases. (The full survey instrument may be viewed at nsse.iub.edu/links/surveys; some questions have been modified for an updated version of the survey launching in 2013).

Another noteworthy feature of NSSE and CCSSE is uniform, centralized administration procedures: sampling, invitation messages, follow-up messages to nonrespondents (NSSE only), data file creation, and tabulation of results are all managed centrally.⁷ This uniformity of procedures ensures the comparability of results across institutions, which is related to another design principle for these surveys: results should provide participating institutions a suitable context for interpreting their results. Comparability of results across institutions means that faculty and administrators at participating institutions can interpret their student engagement findings relative to a meaningful comparison group and also make meaningful internal comparisons (e.g., among different schools or colleges within a university).

NSSE and CCSSE Benchmarks of Effective Educational Practice

The effort to focus the attention of campus leaders and faculty members on student engagement is ultimately about creating campus environments that are rich with opportunities for engagement. Because the institution has a substantial degree of influence over students' learning behaviors, perceptions, and environments (Pascarella & Terenzini, 2005), student engagement data provide valuable

Table 2.1 Representative NSSE questions

<i>In your experience at your institution during the current school year, about how often have you done each of the following?</i> [Very often/Often/Sometimes/Never]
Asked questions in class or contributed to class discussions
Made a class presentation
Worked on a paper or project that required integrating ideas or information from various sources
Worked with classmates outside of class to prepare class assignments
Discussed ideas from your readings or classes with faculty members outside of class
Received prompt written or oral feedback from faculty on your academic performance
Worked harder than you thought you could to meet an instructor's standards or expectations
<i>During the current school year, about how much reading and writing have you done?</i> [discrete ranges]
Number of assigned textbooks, books, or book-length packs of course readings
Number of written papers or reports of 20 pages or more
Number of written papers or reports of between 5 and 19 pages
Number of written papers or reports of fewer than 5 pages
<i>During the current school year, about how often have you done each of the following?</i> [Very often/Often/Sometimes/Never]
Attended an art exhibit, play, dance, music, theater, or other performance
Examined the strengths and weaknesses of your own views on a topic or issue
Tried to better understand someone else's views imagining how an issue looks from his or her perspective
<i>About how many hours do you spend in a typical 7-day week doing each of the following?</i> [discrete ranges]
Preparing for class (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)
<i>Select the circle that best represents the quality of your relationships with people at your institution</i> [7-point scale with specified anchors at each end of the scale]
Relationships with other students [Unfriendly, Unhelpful, Sense of alienation...Friendly, Helpful, Sense of belonging]
Relationships with faculty members [Unavailable, Unhelpful, Unsympathetic...Available, Helpful, Sympathetic]
<i>To what extent does your institution emphasize each of the following?</i> [Very much/Quite a bit/Somewhat/Very little]
Spending significant amounts of time studying and on academic work
Providing the support you need to help you succeed academically
Encouraging contact among students from different economic, social, and racial or ethnic backgrounds
Attending campus events and activities (special speakers, cultural performances, athletic events, etc.)

Source: National Survey of Student Engagement, The College Student Report (Web version). Adapted from http://nsse.iub.edu/pdf/survey_instruments/2012/NSSE2012_US_English_Web.pdf

Notes: Response frame indicated in brackets. Some items have been modified for a 2013 update of the survey.

diagnostic information for institutional leaders, faculty, and others to consider how and where to exert their efforts. For this reason, assessments of student engagement are said to provide actionable information for the institution (Kuh, 2009). NSSE and CCSSE were designed to serve as benchmarking tools that institutional leaders can use to gauge the effectiveness of their programs by comparing results for their students against those from a group of comparison institutions. A benchmarking approach assumes that the unit of analysis is the institution and that the group-level score is reliable. Generalizability studies have shown that NSSE's engagement measures are dependable measurements of group means (Fosnacht & Gonyea, 2012; Pike, 2006a, 2006b). Of course, group scores need not be limited to entire institutions. Institutions can and should drill down into their engagement data by computing group scores for different types of students such as by socio-demographic characteristics, transfer status, residence, college or major, or participation in special programs such as a learning community or a student-faculty research initiative.⁸

As survey-based assessments intended to inform educational practice, both NSSE and CCSSE confront the challenge of condensing results from a large number of individual items into readily understood summary measures for use by institutional personnel with varying levels of quantitative sophistication. Both projects compute summary measures that combine thematically related items into what they call "Benchmarks of Effective Educational Practice." The NSSE benchmarks include Level of Academic Challenge, Active and Collaborative Learning, Student-Faculty Interaction, Enriching Educational Experiences, and Supportive Campus Environment. In describing the NSSE benchmarks, Kuh (2001) wrote that they "represent educational practices that resonate well with faculty members and administrators" while they are also "understandable to people outside the academy like parents of prospective students, accreditors, and so on" (p. 14). Reflecting both common and distinctive concerns of community colleges, CCSSE's benchmarks include Academic Challenge, Active and Collaborative Learning, Student-Faculty Interaction, Student Effort, and Support for Learners. Although factor analytic procedures informed the creation of the NSSE and CCSSE benchmarks, these results were combined with expert judgment to create clusters that would have clear face validity and actionable import for institutional users (Kuh, 2003, 2009; Marti, 2009). While the benchmarks are organized thematically, they do not necessarily represent unitary constructs. Indeed, close examination of the constituent elements of some benchmarks makes this plain (see McCormick & McClenney, 2012). But the NSSE project's publication of reliability coefficients for benchmarks and the use of benchmarks in published research as if they were scales may have obscured their nature as composite measures rather than psychometrically pure scales. Misunderstanding and mixed messages about the nature of the benchmarks has led some researchers to investigate their dimensional structure and criticize them as psychometrically inadequate or unjustified (see, e.g., Campbell & Cabrera, 2011; LaNasa, Cabrera, & Transgrud, 2009; Porter, 2011). However, McCormick and McClenney (2012) have argued that this approach overlooks what the benchmarks represent and how they were constructed.

NSSE Deep Approaches to Learning Scale

Informed by Bloom's taxonomy of educational objectives, a set of items on the NSSE and CCSSE surveys asks about the cognitive tasks emphasized in courses (i.e., memorization, analysis, synthesis, making judgments, and application). Other NSSE items tap the frequency with which students integrate learning from different sources and contexts, examine or revise their prior understanding as a result of their learning, or entertain others' perspectives. NSSE researchers have used these items (minus memorization) to form a "deep approaches to learning" scale comprising three subscales: higher-order learning, integrative learning, and reflective learning (Nelson Laird, Shoup, & Kuh, 2006; Nelson Laird, Shoup, Kuh, & Schwarz, 2008). The deep approaches to learning scale offers a further perspective on student engagement by linking to cognitive science research distinguishing "surface-level" and "deep" processing as well as findings relating deep processing to learning outcomes (Marton & Säljö, 1976a, 1976b, 1984).⁹

Conceptual and Methodological Questions

Because NSSE and CCSSE assess student engagement cross-sectionally, one cannot conclusively rule out the possibility that engagement merely reflects differences in students' predisposition to participate in educationally purposeful activities. But evidence from the Beginning College Survey of Student Engagement (BCSSE) suggests that high school engagement does not account for differential outcomes among students with different levels of engagement during the first year of college. BCSSE asks entering college students about their academic and cocurricular experiences in high school and their expectations for engagement (i.e., their expectations to participate in a range of activities representing engagement) during the first year of college. A 2008 analysis of BCSSE data used a simple measure to represent engagement disposition—an estimate of the likelihood that a student would evidence engagement in the first year of college, based on reported engagement behaviors in high school and expectations for the first year of college—then examined actual engagement and the relationship of both (disposition and first-year engagement) to a student's intent to return for the second year (NSSE, 2008). While engagement disposition was indeed related to first-year engagement, the results showed that actual first-year engagement trumps disposition in predicting intent to return. Regardless of a student's precollege engagement disposition, more challenging coursework, collaborative learning, and interactions with faculty were positively related to higher inclinations to return the following year. This finding suggests that variations in first-year engagement reflect more than individual differences in prior inclinations and preferences and have an independent relationship to outcomes.

Although prior research has generally supported the use of self-reported data on college students (see Pace, 1985; Pike, 2011), Porter (2011) has raised questions about the validity of college student surveys in general, using NSSE as an example.

The core objections can be distilled down to four assertions: (1) NSSE's content domain is "overly broad" (p. 51), and a sufficient theoretical rationale for every item on the survey has not been provided; (2) stages of the response process articulated by Tourangeau et al. (2000) pose validity challenges related to comprehension, recall, judgment, and response; (3) the dimensional structure and reliability of NSSE's data reduction scheme (the Benchmarks of Effective Educational Practice, previously discussed) are inadequate; and (4) evidence of relationships between measures of student engagement and other measures for which a relationship is expected is inadequate.

The complaint about the content domain comes as no surprise. As explicated above, student engagement weaves together a variety of content areas in the interest of providing research-informed evidence in service to the improvement of undergraduate education. In this regard, student engagement is inherently untidy and lacking in parsimony, because surveys of student engagement were not created with the aim of theory building or of testing a narrow theoretical construct. On the other hand, while researchers may cherry-pick questions on the survey and assert an inadequate theoretical underpinning, there is in fact ample literature undergirding most questions on the NSSE and CCSSE surveys. Indeed, CCSSE's Web site even provides a representation of the survey with each question hyperlinked to an annotated bibliography (see <http://www.ccsse.org/aboutsurvey/biblio/page1.cfm>). At a deeper level, this objection illustrates how the standards and objectives of pure research may be at odds with the needs of practice (Altbach, 1998; Keller, 1985; Terenzini, 1996).

Much of the critique regarding the response process is characterized by speculation, unwarranted generalization, and selective use or exclusion of evidence, as well as simply noting inherent and well-known limitations of survey research (see McCormick & McClenney, 2012 for detailed elaboration of these points). Conspicuously absent are any references to published research documenting the extensive testing of NSSE's questions with hundreds of students at more than a dozen institutions using focus group and cognitive interview techniques. Reporting the results of this work, Ouimet, Bunnage, Carini, Kuh and Kennedy (2004) concluded that "[g]enerally, students found the questions to be clearly worded and easy to understand. The number of items that prompted discussion [in focus groups] was relatively small, less than 10% in most focus groups" (p. 240) and that the "majority of students interpreted the questions in identical or nearly identical ways" (p. 247). In this work, questions found to be problematic were rephrased, and the modified items were then tested through cognitive interviews. Subsequent research replicated this approach to examine item function among students of color and at minority-serving institutions, with comparable findings (Kuh, Kinzie, Cruce, Shoup, & Gonyea, 2007).

These concerns notwithstanding, some elements of the response process critique merit investigation. For instance, questions have been raised about the current-year time frame underlying NSSE questions. While shortening the frame to, say, 48 hours or even a week would introduce new validity challenges related to rhythms of the academic calendar (McCormick & McClenney, 2012), such variations in question

framing should be investigated. Porter (2011) also recommends the use of time diary methods as an alternative to using surveys to measure student behavior. Although diary methods have their own validity issues (Bolger, Davis, & Rafaeli, 2003), it could be valuable to investigate what differences might exist between survey and time diary or time-sampling methods in characterizing the behavior of college students.

Regarding the matter of relationship to other measures, we note simply that much of the validity critique addressed at NSSE relies heavily on standards of criterion validity—the expectation that a survey response on a question about number of papers assigned or college grades, for example, would match an objective source of the same information. This represents both a narrow conception of validity and a fundamental misunderstanding of how NSSE data are typically used: to make relative comparisons among groups of students. What matters is not a point estimate of the number of pages written, but that certain groups—STEM majors, part-time students, or students attending larger institutions—may write more or less than their peers. Indeed, Pike (1995) concluded that, for making intergroup comparisons, self-report data lead to similar conclusions as would be reached using more accurate objective measures. This bears on conventional understandings of validity, which emphasize that validity judgments are inextricably linked to the proposed *uses* of assessment information (see Borden & Young, 2007).

Whereas some view NSSE as spanning an overly broad content domain, Dowd, Sawatzky and Korn (2011) fault NSSE and CCSSE for construct *underrepresentation*. Specifically, they take issue with the quality of effort paradigm, arguing that it fails to take account of intercultural effort on the part of minority-group students. But they go further, calling for surveys to measure “all aspects of ‘student effort’” (p. 22). This raises questions about the scope of the concept. The argument also implies that intercultural effort applies only to racial/ethnic minorities, without providing any theoretical justification for the limitation. Might it not also be relevant to a range of “otherness” relative to the majority, such as students with disabilities or first-generation college students, for example? These questions suggest the need for further theoretical development to articulate the reach and limits of a comprehensive understanding of student effort. The article also inexplicably overlooks relevant content on the NSSE and CCSSE surveys. While the authors offer a valuable first step toward “theoretical foundations and a research agenda to validate measures of intercultural effort” (the title), it is never clearly articulated why such measures belong within the student engagement framework as opposed to other assessments of institutional climate. (See McCormick & McClenney, 2012, for a more comprehensive response to this critique.)

Given the purposes of student engagement surveys, it’s important to say a word about face validity. In questioning the validity of college student surveys, Porter (2011) chides survey researchers for what he judges an excessive emphasis on face validity. This reveals a fundamental disconnect between the ideals of pure research and what may be required to gain the attention and interest of faculty and administrators who come from a wide variety of disciplinary backgrounds. Indeed, face validity is arguably a *necessary condition* for convincing key constituencies that a worrisome gap exists between our aspirations for the college experience and the

lived experience of college students. In this respect, skepticism about the value of face validity is emblematic of the dangerous gap that sometimes exists between what researchers value and what institutional leaders and policy makers need (see Keller, 1985; Kezar, 2000).

We acknowledge that surveys of student engagement are blunt instruments that yield imperfect information (a fact that on its own helps to explain modest correlations with various outcome measures). But we believe strongly that (1) imperfect information is more useful than no information and (2) action on the imperative to improve higher education cannot be deferred until the research community can develop substantially error-free measurement approaches (see Ewell, McClenney, & McCormick, 2011).

Empirical Applications and Synthesis of Findings

Studies that link student engagement to college outcomes such as critical thinking, moral development, and leadership capacity or to other indicators of success such as grades, persistence, and graduation help faculty and institutional leadership understand student success so they can design faculty development programs, revise curricula, develop student support programs, and redirect resources where they can be most effective. In this section, we examine illustrative findings using NSSE and CCSSE data showing how student engagement corresponds to a range of desired outcomes.

The Wabash National Study of Liberal Arts Education (WNSLAE) has provided some of the strongest recent evidence about the relationships between students' experiences and their learning and development. Administered by the Wabash College Center of Inquiry in the Liberal Arts, WNSLAE used a longitudinal design incorporating pre- and posttests to gather evidence on the contribution of effective teaching practices and learning experiences to outcomes, as well as the institutional conditions that foster them within the framework of a liberal arts education. Since its pilot in 2005, the study has collected data from over 17,000 students enrolled at 49 US colleges and universities (not limited to liberal arts colleges). WNSLAE examined student learning and development using quantitative measures of six broad liberal education outcomes: critical thinking and problem solving, inclination to inquire and orientation toward lifelong learning, intercultural effectiveness, leadership, moral reasoning, and personal well-being. The project also collected a wide array of information about the student experience, including measures of student engagement from NSSE (Blaich & Wise, 2011b).

Validating NSSE and CCSSE Engagement Measures

Pascarella, Seifert and Blaich (2010) used WNSLAE data from 19 institutions to examine the predictive validity of the NSSE benchmarks at the institution level by investigating their relationships to five WNSLAE outcomes (effective reasoning

and problem solving, moral character, inclination to inquire and lifelong learning, intercultural effectiveness, and personal well-being), assessed using seven instruments. The analysis was conducted using institution-level measures of both benchmarks and outcomes, controlling for the average institutional pretest score on the outcomes. The researchers found that four of the five NSSE benchmarks had at least one significant positive association with mean institution-level outcome scores after the first year of college, net of differences in the average pretest scores of their entering students. The one benchmark that did not show significant positive relationships with the outcomes was student-faculty interaction, and the researchers surmised that this reflects the wide range of reasons for students to meet with faculty, spanning the interests of high achievers to students experiencing academic difficulty.

Connecting the Dots

Early in NSSE's development, project researchers sought to investigate connections between student engagement and commonly examined outcomes such as persistence and grades. With support from the Lumina Foundation, a study called "Connecting the Dots" (CTD) explored the relationships between these indicators of student success and measures of student engagement and institutional practice. NSSE asked a diverse group of 18 bachelor's degree-granting institutions participating in the survey to subsequently provide student-level records on two key outcomes of college: persistence to the second year (for first-year students only) as indicated by enrollment in the fall semester following the spring NSSE administration and academic achievement as measured by full-year GPA (for both first-year students and seniors).¹⁰ Additional student background information on family income, educational aspirations, precollege grades, and entrance examination scores was also collected for use as statistical controls. These data, gathered in the months *after* students completed the NSSE instrument, were merged with NSSE data and thus represented outcomes that emerged from the experiences and conditions for engagement reported on by the students. An additional goal of CTD was to determine the stability of the results for students from different racial and ethnic backgrounds, as well as students attending minority-serving institutions (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008; Kuh et al., 2007).

CTD led to two conclusions about the effects of student engagement on academic achievement and persistence. First, engagement has significant positive, though modest, relationships with grades and persistence for students from different racial and ethnic backgrounds, even after controlling for a wide range of key precollege variables. Second, engagement has stronger effects on first-year grades and persistence to the second year for underprepared and historically underserved students (Kuh et al., 2008). In other words, these analyses showed that engagement pays greater dividends with regard to outcomes for the very populations that higher education most struggles to serve well.

CCSSE Validation Studies

In 2006, CCSSE researchers published the results of three validation studies commissioned to document the relationships between student engagement and key student outcomes such as academic performance as measured by grades and credit accumulation, persistence as indicated by course completion and re-enrollment, and degree or certificate completion (McClenney & Marti, 2006). Validation data connecting engagement to outcomes were obtained from three external student-level data sets: (a) Florida Department of Education records from the 28 Florida community colleges, (b) a consortium of Hispanic-serving community colleges, and (c) Achieving the Dream data from community colleges in five states. Findings showed significant positive associations between student engagement and outcomes, supporting the proposition that student engagement is related to student success in the 2-year sector.

Other Studies of the Relationship Between Student Engagement and Outcomes

Persistence. Student engagement activities are often linked with persistence toward educational goals. For example, engaging in high-impact activities and cocurricular involvements increased a first-year student's probability of returning for a second year, particularly for African American students (Kuh, 2008; Kuh et al., 2008). Others found that students who withdrew from their institution had lower levels of engagement than those who finished a second year at their institution (Hughes & Pace, 2003). Student persisters and graduates at two-year institutions were more likely to work collaboratively with other students, put more time into their studies, do more challenging academic work, interact more with faculty members in substantive ways, and had more positive ratings of the campus environment (McClenney & Marti, 2006).

Critical Thinking. In addition to the WNSLAE results reported above, measures of critical thinking have also been positively associated with academic challenge, amount of reading and writing (a component of academic challenge), and institutional emphasis on academic support and promoting contact among students with different backgrounds (Carini, Kuh, & Klein, 2006). For first-year students, the number of short papers written and frequency of coming to class having completed assignments seems to have the most positive effect on critical thinking gains, while seniors benefited most from integrating ideas from different courses to complete assignments and receiving prompt feedback from faculty members.

NSSE's measures of enriching educational experiences include interactions with diverse others, both with respect to student behavior and environmental emphasis. Loes, Pascarella and Umbach (2012) used WNSLAE data to investigate the relation-

ship between diversity experiences and the development of critical thinking skills. While exposure to diversity experiences in the classroom and interactions with diverse others on campus had no overall effect on critical thinking, meaningful conditional effects were detected. With statistical controls for a host of student and institutional characteristics, the analysis showed that White students evidenced significant, positive benefits of diversity activities on critical thinking while the relationship was not significant for students of color. In addition, students who entered college with lower levels of precollege achievement gained more in critical thinking as a result of diversity activities, compared with their counterparts with higher test scores. These results suggest that there are important conditional influences on the development of critical thinking skills that vary with a student's background (Loes et al., 2012).

GRE Scores. Graduate Record Examination scores have also been positively linked to student engagement, particularly with the amount of reading and writing. What's more, compensatory effects were also evident in these models. Other things equal, at increasing levels of certain forms of engagement (e.g., reading and writing, course emphasis on higher-order thinking, and integrating diversity into coursework), lower-ability students realized a greater increment in GRE scores than otherwise similar students with higher levels of entering ability (Carini et al., 2006).

Moral Reasoning. In another analysis of WNSLAE data, Mayhew, Seifert, Pascarella, Nelson Laird and Blaich (2012) found that NSSE's deep approaches to learning scale had modest positive effects on moral reasoning for first-year students, even after controlling for precollege moral reasoning. The effect was strongest for the integrative learning subscale, which includes items related to incorporating diverse perspectives in class assignments, integrating information from multiple sources in writing assignments and projects, combining ideas from different courses in assignments or class discussions, and discussing ideas from courses or readings with faculty members or others.

Need for Cognition. Analyses of WNSLAE data found that interactions with faculty outside of the classroom and having meaningful discussions with diverse peers positively affected first-year students' growth in *need for cognition*—a desire to engage in cognitive activities—net of background characteristics such as SES and first-generation status (Padgett et al., 2010).

Studying the Effects of a Liberal Arts Education. Wabash study researchers investigated the validity of a scale measuring core liberal arts experiences—which included a number of student engagement measures, such as academic effort and challenge, student-faculty contact, high expectations on the part of faculty, active learning, collaborative learning, diverse interactions, and environmental support—as it related to six key outcomes espoused by advocates for liberal arts education. The researchers found that after taking student and institutional characteristics into account, liberal arts experiences had a positive effect on four of six outcomes, namely, intercultural effectiveness, inclination to inquire and lifelong learning, psychological well-being, and socially responsible leadership (Seifert et al., 2008).

Typological Research on Student Engagement

Hu and McCormick (2012) used NSSE data from 14 four-year WNSLAE institutions to develop a cluster analytic typology of student types based on the pattern of first-year students' engagement as indicated by the five NSSE benchmarks and then conducted a multivariate analysis of the relationship between student type and a range of outcomes including first-year GPA, self-reported gains over the first year, first-year gains on four of the objective WNSLAE assessments, and persistence to the second year. The analysis produced seven types representing different engagement patterns, with each group representing from 10 to 17% of the sample. For the present discussion, two polar opposite groups are of interest: the "Disengaged," representing 13% of the sample, and "Maximizers," who accounted for 10%. The average member of the Disengaged was well below the mean on all five benchmarks, with z-scores ranging from $-.87$ to -1.39 . Maximizers, by contrast, were on average at least a full standard deviation *above* the mean on all five benchmarks (average z-scores ranging from 1.04 to 1.76). Controlling for background characteristics (gender, race/ethnicity, parents' education, and entrance examination score), major or intended major, and institution attended, membership in the Disengaged (relative to a third group not discussed here) was significantly and negatively related to the total gain on the four assessments, total self-reported gains, and GPA. Being a Maximizer (relative to the same third group) was significantly and positively related to total gain on the four assessments, total self-reported gains, and persistence to the second year. This exploratory study suggests promise in the application of typological methods to understanding student engagement and its relationship to success, especially in view of the fact that most of the variability in student engagement (as represented by the NSSE benchmarks) is between students rather than between institutions (NSSE, 2008).

Engagement data can not only be used to identify student types, they can also be used to construct a typology of institutions based on students' patterns of engagement. Using institution-level NSSE data for seniors, Pike and Kuh (2005b) applied Q-factor analysis and found seven institutional types that accounted for 80% of the variance between institutions. These types, partially aligned with Basic Carnegie Classification, were grouped according to their student engagement profiles. The types were given descriptive names such as "intellectually stimulating," "interpersonally supportive," and "high-tech, low-touch." No institution was found to be uniformly high or low on the 12 engagement measures used in the study. Rather, the engagement patterns suggested that most institutions had something to offer. The finding that the types were somewhat related to the Carnegie system led the authors to recommend that the typology be used as a supplement to the classification rather than as a substitute (Pike & Kuh, 2005b).

Student Engagement in Community Colleges

In other research, community college students were much more likely to be engaged in the classroom through activities designed by the instructor than to be engaged outside of the classroom in college-sponsored extracurricular activities. For this

reason, CCSSE researchers urge community colleges to emphasize intentional design of learning activities through syllabi, in- and out-of-class assignments, and other engagement-focused educational experiences (McClenney, 2007).

Another key finding from CCSSE includes an “effort-outcome gap” for certain students of color and students who are not fully academically prepared for college work. While these students were at a higher risk of dropping out, results showed that those who persisted were *more* engaged than their peers, suggesting that more effort may be needed to produce the same desired outcomes, perhaps to overcome disproportionately greater academic and institutional barriers for this population (Greene, Marti, & McClenney, 2007). This finding was also seen as indirect evidence of the positive relationship between engagement and full-year persistence: because CCSSE is administered in the spring, a “survivor effect” may be biasing the sample—eligibility to complete the survey requires that a student must still be enrolled in the spring.¹¹

Investigating Trends in Institution-Level Measures of Student Engagement

In her contribution to a volume on the gap between research and practice in higher education, K. Patricia Cross (2000) wrote: “Evidence is a familiar and revered term to researchers, yet there is precious little evidence collected and disseminated by researchers to demonstrate that they are making a difference in educational practice” (p. 73). Given that a core purpose behind NSSE’s founding was to inform institutional improvement, it is appropriate to interrogate the longitudinal data for evidence of impact: are there signs of improvement? NSSE’s 10th anniversary in 2009 provided the occasion for initial investigation of this question. After identifying more than 200 institutions that had administered the survey at least four times between 2004 and 2009 (a period during which no major changes had been made to the survey or benchmarks) and that satisfied minimum response rate and sample size criteria, an analysis was undertaken to identify statistically significant trends in benchmark scores and in the proportion of students participating in high-impact practices (see Kuh, 2008), analyzing first-year and senior data separately (NSSE, 2009a). The results indicated that 41% of institutions in the first-year analysis and 28% in the senior-year analysis showed a positive trend on at least one measure, while only a handful showed negative trends. Positive trends were detected across categories of institutional size, control, and Basic Carnegie Classification. For about one in eight institutions in each group, the effect size associated with the change between end points was at least .5 (NSSE, 2009a). Based on the results of this initial analysis, a more ambitious study was launched with support from the Spencer Foundation, using a wider range of measures and time frames, with a research design incorporating qualitative inquiry into the circumstances underlying the observed changes. Although that study is ongoing, some early findings bear mention. The quantitative analysis examined a diverse sample of 534 institutions that administered NSSE at least four times between 2001 and 2009 and that satisfied data quality

criteria (sampling error and response rate or sample size) for each administration. Two-thirds of the sample had at least five administrations, and one-quarter had seven or more. The quantitative analysis of first-year measures found detectable positive trends on at least one measure for 322 institutions and for 270 on the senior-year measures. Corresponding figures for negative trends were 44 and 38, respectively. In other words, positive trends outnumbered negative ones by a seven to one margin, strongly suggesting that the analysis is not improperly attributing meaning to chance variation (McCormick, Kinzie, & Korkmaz, 2011).

The second phase of research involved the analysis of questionnaires returned by institutional contacts at 61 institutions (out of 110 invited). In the vast majority of cases, respondents attributed the positive trends to intentional change efforts at the selected institutions.¹² When asked a closed-ended question about motivators for the changes, the three most commonly selected choices were, in descending order, “institutional commitment to improving undergraduate education,” “data that revealed concerns about undergraduate education,” and “faculty or staff interest in improving undergraduate education.” By contrast, few respondents indicated “national calls for accountability” or “mandates from governing, state, or legislative boards” (McCormick et al., 2011).

Five propositions emerge from this ongoing research. First, the fact that more positive trends were detected for first-year students than seniors suggests one or perhaps both of the following: that institutional concern with retention may be directing greater attention to interventions to improve the first-year experience and that gains in student engagement may be easier to achieve in the first-year than in the senior-year experience. Second, the fact that more trends were detected for active and collaborative learning than for any other measure suggests that institutions and faculty may have particularly prioritized their curricula to promote these learning activities. (It is also possible that these findings are partly attributable to broader changes in pedagogy preferences, independent of strategic action by institutions.) Third, because there were many instances of positive trends on the same measure for both first-year students and seniors, it appears be that some institutions are targeting a specific change effort broadly, across the undergraduate experience. Fourth, the fact that positive trends were detected at all types of institutions—not just small, private, residential colleges—indicates that sustained positive change is not constrained by structural features. Finally, change appears to have come about because key actors at the institution were intrinsically motivated to improve, rather than to meet compliance standards or to salve external calls for accountability.

Other Findings of Note

Each year, NSSE compiles data and key findings in a widely released report called *Annual Results*. These reports introduce new and useful engagement concepts and add texture and nuance to our understanding of the undergraduate experience. We offer below a brief selection of such findings not already described, each of which

offers opportunities for further investigation, both by researchers and institutional personnel charged with educational improvement.

Preparation for class falls well short of the conventional standard. NSSE has consistently found a large gap between the amount of time students spend preparing for class and the conventional expectation of 2 hours of preparation for each hour of class time. The average student spends about half as much time preparing for class (NSSE, 2001, 2011).¹³ But the aggregate figure masks considerable variation by discipline. For example, full-time seniors in engineering average nearly 20 hours per week preparing for class, 5 hours more than their peers in the social sciences and business. Viewed another way, about 40% of full-time seniors in engineering spend at least 20 hours preparing for class, compared to about one-quarter of those in education and social sciences and one-fifth of business majors (NSSE, 2011). Interestingly, evidence from the Faculty Survey of Student Engagement suggests that faculty themselves no longer adhere to the conventional expectation: the average study time figures generally fall only about 1 hour shy of the amount that faculty members in these disciplines report they expect of the typical upper-division student taught (the exception being social science faculty, who expect 4 hours more than their senior majors report) (NSSE, 2011).

Despite the apparent gap between convention and practice with respect to study time, about one in five students reports “often” or “very often” coming to class without having completed readings or assignments (NSSE, 2008). And while they commit more time to studying than their peers, engineering majors are more likely than others to report frequently coming to class without having completed all assignments (NSSE, 2011). Taken together, these findings raise concerns about a breakdown of shared responsibility for learning—students failing to take full advantage of their educational opportunities and faculty members allowing students to get by with too little effort.

Women’s colleges are more engaging. Both first-year and senior women attending women’s colleges experience more challenging coursework, learn in more active and collaborative ways, have more frequent interactions with faculty, and have more diversity-related experiences than women at other types of institutions (NSSE, 2003).

As the share of departments educating both undergraduates and graduate students goes up, undergraduate student engagement goes down. McCormick, Pike, Kuh and Chen (2009) examined the relationship between the new Carnegie classifications and measures of student engagement, as well as self-reported learning gains. In a hierarchical analysis of student engagement as measured by the NSSE benchmarks, the study found a consistent negative relationship between “graduate coexistence” and all five benchmark scores, net of a host of student and institutional characteristics, including institution size and control, residential character, and aggregate proportion of graduate/professional students.

Deep learning activities are associated with a wide range of benefits. Students who engage more in deep learning activities devote more time to class preparation, participate more in cocurricular activities, perceive greater educational and personal gains from college, perceive their campus to be more supportive, and tend to be more satisfied overall with college (NSSE, 2004).

Distance learners are, on average, engaged students. Students who take all of their courses online tend to be older, attend part time, work full time, and are more likely to care for dependents. Consistent with that profile, they participate less in collaborative learning activities. However, these students also participate more in academically challenging coursework, engage in more deep learning activities, and reported greater developmental gains from college (NSSE, 2006, 2008).

Student engagement varies more within colleges and universities than between them. Student experiences within any given campus are known to vary widely, from the most highly engaged, top performing student who maximizes as many learning opportunities as time allows, to others who do the minimum to get by, choose not to interact with faculty or others on campus, and fail to take advantage of opportunities to enrich their undergraduate years. This variation among students within the college environment is often overlooked in favor of institutional comparisons that compare the theoretical average student at one school with the average student at peer institutions. The focus on institutional averages is reinforced by the contemporary accountability discourse, college rankings, and narratives of institutional distinctiveness promulgated by institutional leaders, admissions staff, and alumni. Yet analyses of key engagement measures have consistently shown that over 90% of the variation in individual-level engagement, as measured by NSSE benchmarks, occurs between *students*, not between institutions (Kuh, 2003). An implication of this finding is that even schools with high average levels of engagement have a sizeable portion of under-engaged students, and rankings may be a poor predictor of the quality of any given student's experience (NSSE, 2008).

Linking Research to Practice

Among Pascarella and Terenzini's (2005) general conclusions is the following: "[I]f, as it appears, individual effort or engagement is the critical determinant in the impact of college, then it is important to focus on the ways in which an institution can shape its academic, interpersonal, and extracurricular offerings to encourage student engagement" (p. 602). In advocating assessment of the college environment, Pace (1980) and Astin (1991) sought to influence changes in institutional practice, and this purpose endures in the contemporary application of their ideas. When NSSE and CCSSE emerged in the early twenty-first century, the projects sought to enrich the national discourse about college quality by shifting the conversation away from reputation, resources, and the preparation of entering students in favor of the student experience, and specifically activities bearing on teaching and learning and empirically linked to desired outcomes. To foster this shift, the projects asserted the practical aim of providing administrators and faculty with tools for examining the prevalence of effective educational practices on their campuses and among different student populations. The survey results provide participating institutions diagnostic information about student behaviors and institutional factors that can be influenced in practice and that an array of educators can address. The primary goal of NSSE and CCSSE, then, is to inform

and foster improvement in undergraduate education. We now turn our focus on the choices institutions can make based on student engagement results.

With evidence from assessments of student engagement, practitioners concerned about student success gain instructive insights about their students' educational experiences and how they may be improved. For example, survey results can reveal to faculty members the extent to which students believe courses emphasize memorization or faculty provide timely feedback. Simple data points like these can catalyze discussions about course assignments and learning assessments or about expectations for feedback (Kuh, Kinzie, Schuh, Whitt, & Associates, 2010). Such information can help institutions identify strengths in current practice and also pinpoint where investment in resources and programs may be necessary. Indeed, by disaggregating results by school or by major, pockets of exemplary performance can be identified, celebrated, and elevated as models, just as areas in need of improvement can be identified.

Although student engagement involves both what the student does and how faculty and other institutional personnel establish the conditions for engagement, concern for improvement necessitates that a greater share of responsibility for increasing student engagement falls to institutional actors. The framework for considering student engagement results is not about predicting or pinpointing individual students' motivation and behaviors. Rather, results inform the institution about the extent to which it is deploying resources to promote student engagement and success. In fact, student engagement places significant emphasis on the responsibility of the institution. Student engagement results help colleges and universities hold *themselves* accountable for a quality undergraduate experience (McCormick, 2009).

Institutions' responsibility for student engagement was further emphasized in Harper and Quayle's (2009) *Student Engagement in Higher Education*. This volume summarized research and practice on the needs of diverse students, exposed worrisome engagement trends among these populations, and offered practical guidance for institutions willing to accept responsibility for the engagement of all students. One of the most salient points is the importance of placing the onus for student engagement on faculty, staff, and administrators and for attending to diverse students' needs. Moreover, the volume's depictions of the challenge of student engagement for diverse student populations and research identifying differences in student engagement among students at minority-serving institutions demonstrate the importance of examining within-institution and between-group variations in engagement (Bridges, Kinzie, Nelson Laird, & Kuh, 2008; Nelson Laird, Bridges, Morelon-Quainoo, Williams, & Salinas Holmes, 2007; Nelson Laird & Niskodé-Dossett, 2010).

From Data to Action: Institutional Use of Student Engagement Results

Data-informed improvement initiatives have the potential to increase educational effectiveness. As tools to inform institutional improvement initiatives, NSSE and CCSSE have from the outset documented how institutions use results to guide

improvement efforts. This section illustrates how results have been used by colleges and universities. The emphasis of student engagement on behavior and on effective educational practice, rather than values or satisfaction, offers educators the ability to assess quality in a concrete way and to do so in a way that focuses attention on a range of initiatives, including accreditation self-studies, benchmarking and strategic planning, faculty and staff development, general education reform, retention efforts, state system performance reviews, and more.

NSSE and CCSSE regularly solicit information about institutional use of student engagement results and disseminate examples in reports to institutions, in annual reports, and on their Web sites. More than 500 institutional accounts of NSSE data use have also been documented and are summarized in a searchable online database (see nsse.iub.edu/html/using_nsse_db/).

NSSE recently introduced a series titled *Lessons from the Field* (NSSE, 2009b, 2012) as another vehicle for disseminating what colleges and universities are doing with their results. The two volumes to date capture the growing body of collective wisdom and emerging lessons about the use of student engagement results to advance educational quality. The examples featured represent a range of institutions with respect to size, Carnegie type, region, locale, and control. Topics include assessing quality in the first-year experience, analyzing data to understand persistence to the second year, triangulating NSSE results with advising surveys to improve the undergraduate experience, and efforts to understand differences by academic department and to modify practices in particular areas. These accounts serve as instructive and inspirational examples for institutions seeking to enhance undergraduate teaching and learning and suggest broader lessons about data-informed improvement initiatives in higher education. The following brief examples illustrate institutional uses of NSSE results:

Kalamazoo College's NSSE results reveal consistently high results on items that reflect the hallmarks of the institution's academic and experiential programs. However, when a downward trend was noticed on a particular cluster of NSSE items, college leaders planned specific action and sought more information through campus-wide discussions. For example, student focus groups were conducted to better understand students' perceptions of elements of the supportive campus environment measure (which includes quality of relationships with students, with faculty, and with administrative staff, as well as perceived institutional emphasis on support). Findings from both NSSE and the focus groups informed several policy changes and influenced how student space is designed on campus, including a major renovation of the student center. This illustrates the power of student engagement data to shine a light on the student experience.

Brigham Young University (BYU) participates in NSSE annually to gain a better understanding of student engagement across various departments and the extent to which BYU's educational goals are being realized. When an academic department comes up for review, the Office of Institutional Assessment and Analysis prepares custom reports detailing engagement at the academic unit level for each department (sample size permitting), along with comparisons to other students at BYU and at

peer institutions. This allows each department to assess progress on associated educational goals in relation to student engagement and share their custom reports during retreats where they discuss what the results reveal about their students and the curriculum. Units have made good use of NSSE data on self-reported gains and on the prevalence of student research with faculty members. In addition, BYU's multiyear participation facilitates the mapping of NSSE data to the university's annual senior survey and alumni questionnaire. A repository of multiyear data provides a rich resource for some academic units to identify trends over time and to align their NSSE results with accreditation standards.

The State University of New York at Potsdam (SUNY Potsdam) used its results from nine NSSE administrations to support its 2010 self-study for reaffirmation by the Middle States Commission on Higher Education (MSCHE). Specific NSSE items were aligned with MSCHE standards to report levels of student participation in undergraduate research and service learning as well as to report on student interactions with faculty and administrative staff. NSSE results also informed reviews of general education and academic advising. SUNY Potsdam has made great efforts to encourage data use at the department level, as well. NSSE results are featured on the institution's Web site, and the use of NSSE data has been promoted across campus. Department chairs disseminate disaggregated results in breakout reports and put data into the hands of faculty to help improve pedagogical practice.

These accounts and numerous other examples demonstrate that many institutions go well beyond merely participating in NSSE and CCSSE and warehousing results to making productive use of student engagement data to improve the undergraduate experience. When various justifications for not acting on results (e.g., concerns about data quality, discomfort with or rejection of unflattering results, and the desire for corroborating data) have been exhausted and after observing consistent results over time or from multiple sources, it is time to take action. Understanding how colleges and universities use results and achieve improvements in undergraduate education is important to advancing systemic improvement in higher education.

Institutional Uses as Data

The rich collection of institutional use examples collected over time provides an occasion to analyze across campus accounts and consider broader lessons about effective approaches to advancing data use to improve undergraduate education. Analyses of institutional use across the 43 institutional accounts featured in the two volumes of *Lessons from the Field* led to a set of crosscutting conclusions and recommendations about ways to maximize the use and impact of student engagement results. One recommendation for effective data use includes creating a campus committee, team, or task force to oversee data collection, develop communication strategies, review and interpret results, and serve as a liaison to units to support data use. Another conclusion involves the importance of validating findings by linking engagement results to other data sources to increase confidence in results for use in decision-making. The recommendations about effective ways to use survey results

to initiate action to assess and improve undergraduate education provide practical suggestions for colleges and universities as well as broader insights about fostering data use in higher education.

Additional research on the use of engagement data in assessment, accreditation and planning, and institutional improvement demonstrates practical applications of student engagement findings. Banta, Pike and Hansen (2009) drew on their experiences at several different institutions to illustrate how student engagement results can be used to inform planning, assessment, and improvement. In their examples, student engagement results played an important role through various phases of the cyclical model of institutional planning (goal setting), implementation of plans, assessment of outcomes, use of findings to improve processes, and adjustment of plans to reflect progress (or lack thereof). For example, to address a campus goal of “providing experiences that increase student understanding of other cultures,” the institution reviewed student engagement results related to diversity experiences to understand how students experience the learning opportunities provided. The authors concluded that student engagement results can be effectively used as one source of evidence to develop data-driven plans to improve educational experiences and that data had greater impact when campus leaders fully incorporate results in the planning, assessment, and improvement cycle.

Institutional accounts of student engagement data use also demonstrate how results have helped induce positive changes in teaching, learning, and other institutional practices and show how faculty, student affairs professionals, academic administrators, and others have worked collaboratively to use results to inform policies and practices that foster higher levels of student engagement (Kinzie & Pennipede, 2009). Analyzing accounts of use from nearly 50 institutions led to the creation of a three-step plan for taking action on student engagement results: planning action before results are delivered, examining and sharing results, and moving beyond reports by conducting additional analyses and data collection. Kinzie and Pennipede (2009) illustrate each step and subtask with institutional examples and conclude with six recommendations for turning engagement results into action:

1. Find relevancy and entice with results.
2. Continuously disseminate data in small doses.
3. Appoint student engagement ambassadors.
4. Connect student engagement results to the study of real campus problems.
5. Infuse data into continuous improvement processes.
6. Dig deeper into results.

A comprehensive plan for acting on student engagement results is essential to using results to inform campus practice. In addition, initial action on results need not be on an institutional scale to be effective and result in improvement. Instead, improvement may begin in small ways and accumulate over time, becoming the foundation for larger more encompassing reform efforts.

The foregoing discussion provides examples of how colleges and universities are making use of student engagement data. For the most part, however, these examples have been collected and disseminated by NSSE itself, or by those with formal

responsibility for assessment. In the present accountability climate, with renewed calls from accreditors and others to take assessment seriously, the higher education research community has an unprecedented opportunity to undertake systematic investigation into how data are used—or not—to advance both theory and practice. Theories of organizational learning, leadership, and organizational culture are readily applicable.

Research and Practice Initiatives

Since the beginning of the NSSE project, an important aim was to conduct research on and document effective educational practice, to do so in partnership with a variety of organizations, and to apply results to improve teaching and learning and student success. These projects had practical objectives: their findings focused on understanding assessment and improvement initiatives in context and identifying models and lessons for other campuses. The summaries below briefly highlight the purpose and outcomes of these research projects and their contributions to practice.

Developing Models of Effective Practice. What does a college or university with high levels of student engagement look like? What practices and policies are in place at institutions with retention and graduation rates and levels of student engagement that exceed predictions based on institution and student characteristics? A time-honored approach to improving organizational effectiveness is the identification and adaptation of qualities that characterize high-performing organizations (e.g., Collins, 2001; Peters & Waterman, 1982). The Documenting Effective Educational Practice (DEEP) project employed this approach by systematically examining the conditions that account for student success and highlighting practices associated with high levels of student engagement. NSSE and the American Association for Higher Education (AAHE) collaborated on Project DEEP to examine the daily activities of educationally effective colleges and universities, defined as those with higher-than-predicted graduation rates and higher-than-predicted scores on NSSE's five benchmarks of effective educational practice. Case studies of 20 high-performing colleges and universities of various sizes and types provided rich examples of what they do to promote student success.

Findings from the project, reported in *Student Success in College* (Kuh et al., 2010), included the identification of six conditions for student success and detailed explication of practices associated with the NSSE benchmarks. For example, DEEP institutions have effective policies and practices for working with students of differing abilities and aspirations, and that signal the value attached to high-quality undergraduate teaching, diversity, and support for all students. They also clearly communicate high standards and hold students to them, provide timely feedback, and encourage students to actively engage with course content, faculty and peers, inside and outside the classroom. When these activities complement the institution's "living mission" and values, these conditions create powerful learning environments

that lead to desirable learning outcomes. These institutions were pervaded by what the authors called a “positive restlessness” around student learning and success. A follow-up study conducted with the institutions 5 years later revealed that the conditions for success still held and that certain practices such as an unshakeable focus on student learning and an ethos of continuous improvement were critical to sustaining effective practice (Kuh, Kinzie, Schuh, & Whitt, 2011).

Project DEEP demonstrated that educationally effective colleges and universities craft policies and practices that channel students’ energies to activities that matter to student learning. To support colleges and universities in their efforts to develop engaging experiences, a resource featuring a self-guided framework for conducting a comprehensive, systematic, institution-wide analysis was created to help leaders and staff at other institutions examine the six properties and conditions common to high-performing schools, as well as NSSE’s five benchmarks of effective educational practice in their own context (Kuh, Kinzie, Schuh & Whitt, 2005). Project DEEP findings were also made more accessible for practice through a series of four-page policy briefs targeted to a wide range of audiences including university administrators and leaders, faculty, department chairs, students, and the general public, containing suggestions for promoting student success informed by project findings (see nsse.iub.edu/links/practice_briefs). Findings from this extensive study of conditions for student engagement and success provide research-based models for fostering effective educational practice. Most importantly, the documentation of effective practices and institutional policies provides instructive models for institutions striving to improve educational quality.

Exploring Student Engagement at Minority-Serving Institutions (MSIs). Little systematic attention has been given to examining the student experience and using results for institutional improvement at MSIs. The goal of the Building Engagement and Attainment for Minority Students (BEAMS) Project was to better understand the unique context for collecting and using student engagement data and what fosters institutional improvement at MSIs. This 5-year initiative entailed more than a hundred MSIs using evidence from NSSE and other sources to analyze the scope and character of students’ engagement in their learning. Results included the development and implementation of action plans to improve engagement, learning, persistence, and success and documentation of the approaches that proved effective in advancing data use in MSIs. Results of the study were published in the monograph, *Increasing Student Success at Minority-Serving Institutions: Findings from the BEAMS Project* (Del Rios & Leegwater, 2008), and in a series of 10 topical briefs based on BEAMS project outcomes on topics such as Increasing Student Engagement Through Faculty Development, Leveraging Technology in Campus Change Initiatives, and Purposeful Co-Curricular Activities Designed to Increase Engagement (see www.ihep.org/programs/BEAMS.cfm).

As part of this work, Bridges, Cambridge, Kuh and Leegwater (2005) identified practices and policies for using student engagement data to promote student success at MSIs and, in particular, challenges associated with administering national surveys. An example of data use at the University of Texas at El Paso (UTEP), a Hispanic-serving institution (HSI), illustrates how one campus used student engagement data to identify obstacles to graduation. UTEP’s NSSE data indicated that although students were engaged at reasonably high levels in the first year of college

and persistence rates from the first to second year were relatively good, students became less satisfied with their studies and the campus environment as they progressed. A review of senior NSSE results combined with additional information from senior surveys raised more concerns about the quality of the student experience, prompting UTEP to invite students to help administrators and faculty understand and interpret the results and to provide suggestions for what UTEP could do to improve the quality of undergraduate education. The institutional accounts in this study offer models of evidence-based decision-making that are useful to all colleges and universities. Bridges et al. (2008) extended BEAMS project activities by examining student engagement results for baccalaureate degree-seeking students at BEAMS campuses to estimate the impact of project activities and draw broader implications for data-informed practice.

Descriptions of engagement and educational effectiveness at HBCUs and HSIs demonstrated the strong asset-based philosophy for student learning operating at these institutions and the structure of integrated and redundant opportunities for students to engage with their peers in important educational practices including active and collaborative learning and service-learning experiences. In addition, HBCUs appear to connect students and faculty in ways that increase students' level of engagement and commitment to success, while HSIs effectively connect students to peers to promote success. This tapestry of tradition, clarity of mission (especially for many HBCUs), talent development philosophy, and supportive campus climate helps these institutions overcome sometimes considerable financial and physical plant disadvantages to foster minority student success.

Studying Evidence-Based Improvement. Despite long-standing calls for higher education to embrace assessment and use results to inform educational improvement, relatively little is known about evidence-based improvement in colleges and universities. How do institutions use assessment data to identify problems, formulate improvement strategies, engage important stakeholders in the enterprise, and implement positive change? Described in the previous section, the Spencer Foundation-funded study, *Learning to Improve: A Study of Evidence-Based Improvement in Higher Education*, is investigating institutions with positive trends on NSSE measures to inquire into processes of institutional change. Following the initial quantitative analysis and questionnaire research described above, in-depth qualitative case study methods are being used to examine selected institutions with improved scores to document the impetus for and facilitators of improvement efforts and, more specifically, how campuses enacted change. By describing improvement processes and identifying supporting and inhibiting factors, lessons about what works in institutional change and about the development of a culture of institutional improvement will contribute to the literature on organizational change in higher education.

Research Initiatives Supported by Higher Education Organizations

The potential for using student engagement results to influence educational practice has also been of interest to a variety of higher education organizations and external research groups. Collaborators that have employed student engagement results in

their research and evidence-based practice work include the Council of Independent Colleges (CIC), the Association of American Colleges and Universities (AAC&U), the Center of Inquiry in the Liberal Arts at Wabash College, and the Teagle Foundation. Several such initiatives are described below.

Council of Independent Colleges (CIC) Projects. As the national service organization for small- and mid-sized independent colleges and universities, CIC has advocated the importance of using data about the quality of the undergraduate experience to demonstrate the value of an independent college education and to foster improvement initiatives in the sector. CIC's "Making the Case" series employs NSSE results along with other data sources to demonstrate the educational effectiveness of CIC institutions on such topics as level of academic challenge, student-faculty interaction, and culminating senior experiences (Council of Independent Colleges [CIC], 2011). Another CIC initiative involved continued work with a consortium of institutions using the Collegiate Learning Assessment (CLA) combined with other assessment information to understand educational and programmatic features associated with students' analytic reasoning, critical thinking, and writing gains. A large number of consortium participants elected to use NSSE as part of this work, which has produced two volumes of in-depth analyses from more than 40 institutions documenting their approaches to using student learning and engagement results (as well as results of other assessments) and important lessons from the experience. The collaborative work of the consortium member institutions has helped institutions create a culture of assessment that informs evidence-based faculty deliberation about student learning (CIC, 2008; Paris, 2011). CIC has also coordinated additional work funded by the Teagle Foundation focused on improving undergraduate student learning. One grant supports "Engaging Evidence: Programs for Improving Student Learning," a 2-year project that brings together colleges and universities that have used the results of student learning outcomes assessment to increase both how much and how well students learn. CIC's coordinated work has influenced data use and improvement initiatives at hundreds of independent colleges and universities.

Center of Inquiry in the Liberal Arts (CILA) at Wabash College Projects. From 2006 to 2009, the Center of Inquiry led the Wabash National Study of Liberal Arts Education (WNSLAE, described earlier), a large-scale, longitudinal study to investigate factors that affect liberal arts education outcomes. NSSE was one of several instruments employed to help colleges and universities learn what teaching practices, programs, and institutional structures support liberal arts education and to develop robust methods of assessing liberal arts education. Although WNSLAE is a research project, it also had practical institutional improvement aims in that participating institutions were expected to act on their findings. Reports regarding institutional use of student learning and engagement data (Blaich & Wise, 2010, 2011a) documented the challenges that participating institutions faced in identifying and implementing changes in response to data and also identified five practical steps that campuses should consider implementing as they develop assessment projects to increase the likelihood that they will benefit student learning. In 2010, the Center of Inquiry adapted aspects of the original project to further the study of the formative

use of evidence to promote institutional change. Nearly 50 colleges and universities are continuing to collect and use student engagement results along with other measures of the student experience and to participate in a series of structured site visits, meetings, and workshops; to learn to use evidence to identify an area of student learning or experience that they wish to improve; and then to create, implement, and assess changes designed to improve those areas. The project implements a deliberative process for using evidence that an institution can build on for improvements in student learning. While each institution will focus on improving areas relevant to that institution, faculty, staff, and administrators from these institutions will collaborate during the course of the project as a community of practice, sharing information, approaches, problem-solving strategies, and lessons learned.

Research projects with a strong emphasis on application to effective educational practice in colleges and universities have been a major focus of the NSSE and CCSSE projects from the outset. As the studies described in this section illustrate, much can be learned about the challenges of putting assessment results to work to improve the quality of undergraduate education. Accumulated information about data use from NSSE, CCSSE, CIC, and WNSLAE suggests that many colleges and universities are collecting data about the quality of the undergraduate experience, and a good number are putting these data to use in their efforts to assess and improve undergraduate education. However, this work is challenging and requires a substantial amount of structured intervention and support to induce systematic, sustained study and action. Conducting this work in partnership with other organizations on projects to advance the study of student engagement and to apply results to improve teaching and learning and student success has helped to advance the use of research-informed interventions in colleges and universities. Indeed, student engagement rests on a rich foundation of empirical research on practices related to undergraduate student learning and development. This work is furthered when colleges and universities apply data to understand real campus problems, inform institutional improvement efforts, and monitor the results. Documenting the approaches to and achievements of research and practice fosters greater understanding of what it takes to improve college quality.

Assessing Student Engagement: Current Status, Challenges, and the Agenda Going Forward

Measured against strict scholarly standards of theory construction, student engagement is untidy. It lacks precision and parsimony. It encompasses behaviors, perceptions, and environmental factors. It merges related yet distinct theoretical traditions with a collection of research-informed good practices. But student engagement was not conceived to advance theory, or even to generate testable propositions (though it can be used for those purposes). Rather, the focus on student engagement emerged from the concerns of practice: asserting a new definition of college quality sharply focused on teaching and learning while providing colleges and

universities with measures of process and institutional environment that can inform the improvement of undergraduate education. Because student engagement was explicitly built on a solid foundation of research findings, it represents a noteworthy example of bringing research to bear on pressing concerns of practice. Student engagement integrates what has been learned about quality of student effort, student involvement, and principles of good practice in undergraduate education into a broad framework for assessing quality and guiding its improvement. In this regard, it represents precisely what some leading scholars have argued has been lacking in higher education research (Altbach, 1998; Keller, 1985; Terenzini, 1996). Furthermore, research into institutions with positive trends on measures of student engagement provides ample existence proofs that improvement is possible and that it is not confined to certain institutional types (McCormick et al., 2011). But this history notwithstanding, there are opportunities to deepen and enrich our understanding of student engagement and to develop and refine its theoretical underpinnings while enhancing its relevance to practice.

Toward More Sophisticated Understanding: Differentiation and Granularity

Like many other aspects of the college experience, student engagement varies among students within an institution far more than it varies between institutions. Despite the strong appeal of investigating institutional differences, this within-institution variability represents the low-hanging fruit for advancing student engagement research. We know that patterns of engagement vary with major field of study (Brint, Cantwell, & Hanneman, 2008; NSSE, 2008, 2011), and recent typological investigations have shown that distinctive patterns of engagement exist on campuses, and that these patterns correspond to differences in educational outcomes (Hu & McCormick, 2012). Harper and Quaye (2009) remind us of the imperative to understand how student engagement operates among diverse populations, all of whose success is vital to the future of higher education and the wider society. The long research tradition that undergirds student engagement is largely based on full-time, traditional college-aged, predominantly White, male, residential students. This raises legitimate questions about whether those findings apply to student populations that differ from the historical norm (Bensimon, 2007; Harper & Quaye, 2009). Although student engagement is grounded in decades of research on what matters to student learning and development, it does not imply a uniform conception of the undergraduate experience. Indeed, research on student engagement has already documented differential effects based on student background, with engagement showing modestly stronger positive effects for both underprepared and traditionally underrepresented students (Kuh et al., 2008). There is a need to understand these differential effects and also to investigate how student engagement may manifest itself differently for populations other than those that predominate in the foundational research on college impact. A promising avenue for future research, then, is to

understand variation in student engagement not just with regard to academic major but also for other patterns of affiliation and identity. Among other possibilities, this represents an opportunity to reinvigorate inquiry into the role of peer groups and microenvironments on shaping student experiences and outcomes.

Another opportunity is to go deep. Our understanding of student engagement is largely based on large-scale survey research using NSSE and CCSSE, instruments designed for institution-level assessment. Surveys are inherently blunt instruments characterized by a number of compromises with regard to content area coverage and specificity. For example, both NSSE and CCSSE ask students to describe their educational experiences over the course of a full year, which of necessity requires them to summarize across a range of disparate experiences. The surveys also ask a limited number of questions about a variety of experiences and activities—they go wide but not deep. Thus another avenue of research and development involves manipulating the means and granularity of student engagement research. One version of this work might investigate engagement in the context of specific courses. Some suggestive work has begun with the field-initiated Classroom Survey of Student Engagement (CLASSE) (Ouimet & Smallwood, 2005). CLASSE seeks to apply student engagement concepts at the classroom level, in a faculty development framework. Similarly, Barkley's work (2010) represents an effort to translate the ideas of student engagement into the classroom and the work of faculty members. These offer possibilities for investigating how engagement works in particular classroom settings as well as the factors that lead faculty members to undertake to enhance engagement, how they go about it, and what support may be required. Another manipulation would single out a narrow subset of student engagement topics for detailed investigation, whether using survey techniques, qualitative methods, or a combination of the two.

The focus on student engagement has led to a particular interest in so-called high-impact practices, a diverse set of experiences that stretch and challenge students in a range of ways and that correspond to desirable outcomes (Kuh, 2008; NSSE, 2007). Examples of high-impact practices include learning communities, service learning, internships and field placements, undergraduate research, and culminating senior experiences such as capstone courses and projects. But each of these is subject to considerable variation in the implementation process, and there is a need to better understand the role of implementation in ensuring the effectiveness of these practices. While some of these practices (e.g., learning communities and service learning) have been extensively studied, far more attention is needed to questions of implementation.

Investigating Data Use and Educational Improvement

As suggested earlier, a ripe area for research involves how assessment data are used to inform improvement efforts. In view of calls to establish a “culture of evidence” in our colleges and universities, it is surprising how little independent empirical research has been conducted on how assessment data are actually used in colleges and universities.¹⁴

This work can examine how assessment results are read and interpreted, whether and how those interpretations are converted to action, whether and how those action plans are implemented, and whether and how the results of implementation are monitored and assessed. Given the extent of assessment activity in higher education and the adoption of a number of standard assessment tools and programs, there should be considerable natural variation among institutions in how these processes unfold. Research into institutions with positive trends in NSSE results offers suggestive preliminary findings of the facilitative role played by external projects and initiatives (McCormick et al., 2011), offering another potentially important line of inquiry. Theories of organizational culture, learning, leadership, and change are particularly relevant for these questions.

Challenges and Opportunities

Student engagement research nevertheless faces a number of challenges. These include multiple uses of the term engagement in higher education, calls to more narrowly specify the content domain of student engagement, as well as calls to better our understanding of student engagement among historically underserved groups. As noted in the beginning of this chapter, engagement can mean many things in higher education. This can sow confusion about the various invocations of the term. In addition to previously described uses related to higher education's obligations to and contributions to the surrounding community and polity (community and civic engagement), Arum and Roksa (2011) used the term "social engagement" in their influential book *Academically Adrift* to refer to involvement with peers (ranging from group study to attending fraternity parties). Such varied uses can lead to misunderstandings about student engagement and what it represents.

Even within the literature on student engagement, the phenomena represented by the term are subject to challenge or debate. Some may see engagement's elision of effort, involvement, and integration as problematic. But seeking to impose distinctions among such closely related concepts may be unnecessary. Wolf-Wendel, Ward and Kinzie (2009) concluded that both involvement and engagement reflect the notion that students will invest varying amounts of energy in different activities and that the amount of learning is proportional to the quality and quantity of the college experience. In the authors' interviews with the originators of these concepts, Astin stated that there are "no essential differences" (p. 417) between the terms engagement and involvement, and Kuh indicated that there is considerable overlap between them. Indeed, in their 2005 review of the college impact literature, Pascarella and Terenzini used the terms interchangeably throughout the text.

Axelson and Flick (2010) object to the formulation of student engagement as including both student and institutional components, calling instead for a narrow focus on "student involvement in a learning process" (p. 42), with greater attention to cognitive and emotional, as well as behavioral engagement. As student engagement research matures, such conceptual and terminological refinements can advance theoretical development with regard to student engagement, though we believe that

retaining explicit attention to environmental factors on student learning and development will continue to be important.

At barely over 10 years old, student engagement as a framework for understanding the quality of undergraduate education is in its infancy. A hallmark of student engagement is its capacity to bridge the worlds of researcher and practitioner in the interest of research-informed improvement. Many possibilities exist for extending and refining this work to illuminate our understanding of teaching and learning in higher education and also to achieve a deeper understanding of how colleges and universities engage in intentional, systematic improvement. The work to date has demonstrated not only the promise but the necessity of closing the gap between research and practice.

Endnotes

1. There is also a K-12 literature on engagement, where the focus is more on psychosocial factors, such as motivation, investment, commitment, and interest in school. For example, see Reschly and Christenson (2012) and Newmann (1992).
2. These developments joined an existing movement encouraging sustained and systematic attention to the assessment of educational effectiveness, dating to the 1984 publication of *Involvement in Learning*. In that report, the National Institute of Education's Study Group on the Conditions of Excellence in American Higher Education (1984) had called for increasing "the amount of time, energy, and effort" that students devote to learning and setting high expectations for student learning. It also called for serious attention to the assessment of educational effectiveness. Two years later, the National Governors Association issued its own call for education reform, with another call for the assessment of college-level learning. At about the same time, Boyer (1987) published results from extensive campus visits, survey findings, and comprehensive interviews with key informants ranging from students, high school counselors, and admissions officers to chief academic officers. Boyer identified key issues such as the mismatch between student preparation and faculty expectations, fragmented curriculum, and faculty promotion and tenure policies that may detract from student learning.
3. *U.S. News* no longer publishes a magazine; it is now an exclusively Web-based outlet, except for its various rankings guidebooks. And its rankings enterprise has expanded beyond education to include hospitals, nursing homes, doctors, law firms, insurance companies, mutual funds, diets, and more. The title of the *U.S. News* home page confirms that rankings constitute its core business: "US News & World Report | News & Rankings | Best Colleges, Best Hospitals, and more" (retrieved from usnews.com on June 25, 2012).
4. Examples include increasing the emphasis on entrance examination scores in the admissions process so as to raise the institutional average and increasing the number of students admitted through early decision programs to elevate admissions yield statistics (a criterion that has since been dropped from the rankings formula in response to criticism). Both of these would have the impact of reducing the number of low-income and educationally disadvantaged students admitted. Ehrenberg (2002) documents the effect of rankings on college tuition, where improved rankings are shown to increase the number of applicants, which in turn lowers the burden of institutions to offer financial aid. However, institutions motivated to improve their ranking were under pressure to spend more educating each student, which drives up tuition.
5. Although the details of NSSE's development are beyond the scope of the present chapter, interested readers may refer to Kuh (2009) and Ewell (2010).
6. The initial design for NSSE was produced by a team assembled by Peter Ewell for the Pew Charitable Trusts. The design team included Alexander Astin, Gary Barnes, Arthur Chickering, John N. Gardner, George Kuh, Richard Light, and Ted Marchese (Kuh, 2009).

7. From 2000 through 2009, NSSE was administered to random samples of first-year students and seniors. Since 2010, at institutions electing the online survey administration mode (which constitute the vast majority), the default is to invite all first-year and senior students to complete the survey. CCSSE is administered in class: a stratified random sample of course sections is drawn, and surveys are distributed and completed in the sampled sections.
8. Initially computed only at the institutional level, NSSE benchmarks are now calculated at the student level and returned in student data files to facilitate analysis by subgroups within an institution.
9. Cronbach's alphas from 2011 are as follows (reported separately for first-year students and seniors, respectively): deep approaches to learning, .85 and .86; higher-order thinking, .82 and .83; integrative learning, .70 and .72; and reflective learning, .80 and .80.
10. Full-year GPA would include grades from courses taken during the fall, prior to NSSE administration but within the time period covered by NSSE questions about engagement experiences.
11. The possibility of a survivor effect is one reason why the Center for Community College Student Engagement developed the Survey of Entering Student Engagement, which is administered during the fall and asks students to report on their experiences during the first 3 weeks of college.
12. The final phase of data collection involved site visits to selected institutions. Data analysis from this phase is in progress as of this writing.
13. For evidence on and explanations for long-term changes in the amount of time full-time college students spend studying, see Babcock and Marks (2011) and McCormick (2011).
14. By "independent empirical research," we mean research that is not affiliated with or commissioned by an entity involved in providing data or in promoting or facilitating their use.

References

- Ahlfeldt, S., Mehta, S., & Sellnow, T. (2005). Measurement and analysis of student engagement in university classes where varying levels of PBL methods of instruction are in use. *Higher Education Research and Development*, 24(1), 5–20.
- Altbach, P. G. (1998). Research, policy, and administration in higher education: The Review at twenty. *The Review of Higher Education*, 21(3), 205–207.
- Arum, R., & Roksa, J. (2011). *Academically adrift: Limited learning on college campuses*. Chicago: University of Chicago Press.
- Association of American Colleges and Universities (AAC&U). (2007). *College learning for the new global century: A report from the National Leadership Council for Liberal Education and America's Promise*. Washington, DC: Author.
- Astin, A. W. (1970). The methodology of research on college impact. *Sociology of Education*, 43, 223–254.
- Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Student Personnel*, 25, 297–308.
- Astin, A. W. (1985). *Achieving educational excellence*. San Francisco: Jossey-Bass.
- Astin, A. W. (1991). *Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education*. San Francisco: Jossey-Bass.
- Axelson, R. D., & Flick, A. (2010). Defining student engagement. *Change*, 43(1), 38–43.
- Babcock, P., & Marks, M. (2011). The falling time cost of college: Evidence from a half century of time use data. *The Review of Economics and Statistics*, 93(2), 467–478.
- Banta, T. W., Pike, G. R., & Hansen, M. J. (2009). The use of engagement data in institutional planning, assessment, and accreditation. In R. M. Gonyea and G. D. Kuh (Eds.), *Using NSSE in institutional research. New Directions for Institutional Research*, 141, 21–34.
- Barkley, E. F. (2010). *Student engagement techniques: A handbook for college faculty*. San Francisco: Jossey-Bass.

- Bean, J. P., & Eaton, S. (2000). A psychological model of college student retention. In J. Braxton (Ed.), *Rethinking the departure puzzle: New theory and research on college student retention* (pp. 48–61). Memphis, TN: University of Vanderbilt Press.
- Bensimon, E. M. (2007). The underestimated significance of practitioner knowledge in the scholarship of student success. *The Review of Higher Education*, 30(4), 441–469.
- Blaich, C. F., & Wise, K. S. (2010). Moving from assessment to institutional improvement. In T. A. Seifert, (Ed.). *Longitudinal Assessment for Institutional Improvement. New Directions for Institutional Research*, 2010(S2), 67–78.
- Blaich, C. F., & Wise, K. S. (2011a). *From gathering to using assessment results: Lessons from the Wabash National Study* (NILOA Occasional Paper No. 8). Urbana, IL: National Institute for Learning Outcomes Assessment.
- Blaich, C. F., & Wise, K. S. (2011b). *The Wabash National Study: The impact of teaching practices and institutional conditions on student growth*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual Review of Psychology*, 54, 579–616.
- Borden, V. M. H. & Young, J. W. (2007). Measurement validity and accountability for student learning. In V. M. H. Borden and G. R. Pike (Eds.), *Assessing and accounting for student learning: Beyond the Spellings Commission. New Directions for Institutional Research, Assessment Supplement 2007*, 19–37.
- Bowen, H. R. (1977). *Investment in learning: The individual and social value of American higher education*. San Francisco: Jossey-Bass.
- Boyer, E. L. (1987). *College: The undergraduate experience in America*. New York: Harper & Row.
- Bridges, B. K., Cambridge, B., Kuh, G. D. & Leegwater, L. H. (2005). *Student engagement at minority-serving institutions: Emerging lessons from the BEAMS project. New Directions for Institutional Research*, 125.
- Bridges, B. K., Kinzie, J., Nelson Laird, T. F., & Kuh, G. D. (2008). Student engagement and success at minority serving institutions. In M. Gasman, B. Baez, & C. S. Turner (Eds.), *Understanding Minority-Serving Institutions*. Albany, NY: SUNY Press.
- Brint, S., Cantwell, A. M., & Hanneman, R. A. (2008). The two cultures of undergraduate academic engagement. *Research in Higher Education*, 49, 383–402.
- Bringle, R. G., Games, R., & Malloy, E. A. (Eds.). (1999). *Colleges and universities as citizens*. Needham Heights, MA: Allyn and Bacon.
- Campbell, C., & Cabrera, A. F. (2011). How sound is NSSE? Investigating the psychometric properties of NSSE at a public, research-intensive institution. *The Review of Higher Education*, 35(1), 77–103.
- Carini, R. M., Kuh, G. D., & Klein, S. P. (2006). Student engagement and student learning: Testing the linkages. *Research in Higher Education*, 47(1), 1–32.
- Chickering, A. W., & Gamson, Z. F. (1987, March). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, 3–7.
- Collins, J. C. (2001). *Good to great*. New York: Harper Collins.
- Community College Survey of Student Engagement. (2010a). *The Community College Student Report*. Retrieved from <http://www.ccsse.org/aboutsurvey/aboutsurvey.cfm>
- Community College Survey of Student Engagement. (2010b). *The relationship of the Community College Survey of Student Engagement (CCSSE) and the National Survey of Student Engagement (NSSE)*. Retrieved from <http://www.ccsse.org/aboutccsse/relate.cfm>
- Council of Independent Colleges. (2008). *Evidence of learning: Applying the Collegiate Learning Assessment to improve teaching and learning in the liberal arts college experience*. Washington, DC: Author.
- Council of Independent Colleges. (2011). *A special report on independent colleges and student engagement*. Washington, DC: Author. Retrieved from http://www.cic.edu/Research-and-Data/Making-the-Case/Documents/new_nsse_data.pdf
- Cross, K. P. (2000). The educational role of researchers. In A. Kezar & P. Eckel (Eds.), *Moving beyond the gap between research and practice in higher education. New Directions for Higher Education* 110, 63–74.

- Cruce, T. M., Wolniak, G. C., Seifert, T. A., & Pascarella, E. T. (2006). Impacts of good practices on cognitive development, learning orientations, and graduate degree plans during the first year of college. *Journal of College Student Development*, 47(4), 365–383.
- Del Rios, M., & Leegwater, L. (2008). *Increasing student success at minority-serving institutions: Findings from the BEAMS project*. Washington, DC: Institute for Higher Education Policy.
- Dowd, A. C., Sawatzky, M., & Korn, R. (2011). Theoretical foundations and a research agenda to validate measures of intercultural effort. *The Review of Higher Education*, 35(1), 17–44.
- Edgerton, R. (1997). *Education white paper* (unpublished manuscript). Retrieved from http://www.faculty.umb.edu/john_saltmarsh/resources/Edgerton%20Higher%20Education%20White%20Paper.rtf. Accessed 20 Apr 2012.
- Ehrenberg, R. (2002). *Tuition rising: Why college costs so much*. Cambridge: Harvard University Press.
- Ewell, P. T. (2010). The US National Survey of Student Engagement (NSSE). In D. D. Dill & M. Beerkens (Eds.), *Public policy for academic quality: Analyses of innovative policy instruments*. New York: Springer.
- Ewell, P. T., & Jones, D. P. (1993). Actions matter: The case for indirect measures in assessing higher education's progress on the national education goals. *The Journal of General Education*, 42(2), 123–148.
- Ewell, P. T., & Jones, D. P. (1996). *Indicators of "good practice" in undergraduate education: A handbook for development and implementation*. Boulder, CO: National Center for Higher Education Management Systems.
- Ewell, P. T., McClenney, K., & McCormick, A. C. (2011, September 20). Measuring engagement. *Inside Higher Ed*. Retrieved from www.insidehighered.com/views/2011/09/20/essay_defending_the_value_of_surveys_of_student_engagement
- Feldman, K., & Newcomb, T. (1969). *The impact of college on students*. (2 Vols.). San Francisco: Jossey-Bass.
- Fosnacht, K., & Gonyea, R. M. (2012). *The dependability of the NSSE 2012 pilot: A generalizability study*. Paper presented at the annual meeting of the Association for Institutional Research, New Orleans, LA.
- Gabriel, K. F. (2008). *Teaching underprepared students: Strategies for promoting success and retention in higher education*. Sterling, VA: Stylus.
- Gladwell, M. (2011, February 14). The order of things. *The New Yorker*, 87(1), 68–75.
- Graham, A., & Thompson, N. (2001). Broken ranks. *The Washington Monthly*, 33, 9–13.
- Greene, T., Marti, C. N., & McClenney, K. M. (2007). The effort-outcome gap: Differences for African-American and Hispanic community college students in student engagement and academic achievement. *Journal of Higher Education*, 79(5), 513–539.
- Harper, S. R., & Quaye, S. J. (Eds.). (2009). *Student engagement in higher education: Theoretical perspectives and practical approaches for diverse populations*. New York: Routledge.
- Hu, S., & McCormick, A. C. (2012). An engagement-based student typology and its relationship to college outcomes. *Research in Higher Education*, 53, 738–754.
- Hughes, R., & Pace, C. R. (2003). Using NSSE to study student retention and withdrawal. *Assessment Update*, 15(4), 1–2, 15.
- Keller, G. (1985). Trees without fruit: The problem with research about higher education. *Change*, 17(1), 7–10.
- Kezar, A. (2000). Understanding the research-to-practice gap: A national study of researchers' and practitioners' perspectives. In A. Kezar & P. Eckel (Eds.), *Moving beyond the gap between research and practice in higher education*. *New Directions for Higher Education* 110, 9–19.
- Kinzie, J., & Pennipede, B. S. (2009). Converting engagement results into action. In R. M. Gonyea & G. D. Kuh (Eds.), *Using NSSE in institutional research*. *New Directions for Institutional Research*, 141.
- Kuh G. D. (n.d.). *The National Survey of Student Engagement: Conceptual framework and overview of psychometric properties*. Bloomington: Center for Postsecondary Research, Indiana University. Retrieved from http://nsse.iub.edu/pdf/conceptual_framework_2003.pdf. Accessed 25 Feb 2010.

- Kuh, G. D. (2001). Assessing what really matters to student learning: Inside the National Survey of Student Engagement. *Change*, 33(3), 10–17.
- Kuh, G. D. (2003). What we're learning about student engagement from NSSE. *Change*, 35(2), 24–32.
- Kuh, G. D. (2008). *High-Impact educational practices: What they are, who has access to them, and why they matter*. Washington, DC: Association of American Colleges and Universities.
- Kuh, G. D. (2009). The National Survey of Student Engagement: Conceptual and empirical foundations. In R. M. Gonyea & G. D. Kuh (Eds.). *Using NSSE in institutional research. New Directions for Institutional Research*, 141, 5–20.
- Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects of student engagement on first-year college grades and persistence. *Journal of Higher Education*, 79, 540–563.
- Kuh, G. D., Hayek, J. C., Carini, R. M., Ouimet, J. A., Gonyea, R. M., & Kennedy, J. (2001). *NSSE technical and norms report*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- Kuh, G. D., Kinzie, J., Cruce, T. M., Shoup, R., & Gonyea, R. M. (2007). *Connecting the dots: Multi-faceted analyses of the relationships between student engagement results from the NSSE, and the institutional practices and conditions that foster student success*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- Kuh, G. D., Kinzie, J., Schuh, J. H., & Whitt, E. J. (2005). *Assessing conditions to enhance educational effectiveness: The inventory for student engagement and success*. San Francisco: Jossey-Bass.
- Kuh, G. D., Kinzie, J., Schuh, J. H., & Whitt, E. J. (2011). Fostering student success in hard times. *Change*, 43(4), 13–19.
- Kuh, G. D., Kinzie, J., Schuh, J. H., Whitt, E. J., & Associates. (2010). *Student success in college: Creating conditions that matter*. San Francisco: Jossey-Bass.
- Kuh, G. D., Pace, C. R., & Vesper, N. (1997). The development of process indicators to estimate student gains associated with good practices in undergraduate education. *Research in Higher Education*, 38(4), 435–454.
- LaNasa, S. M., Cabrera, A. F., & Transgrud, H. (2009). The construct validity of student engagement: A confirmatory factor analysis approach. *Research in Higher Education*, 50, 315–332.
- Loes, C., Pascarella, E., & Umbach, P. (2012). Effects of diversity experiences on critical thinking skills: Who benefits? *Journal of Higher Education*, 83(1), 1–25.
- Machung, A. (1998). Playing the rankings game. *Change*, 30(4), 12–16.
- Marti, C. N. (2009). Dimensions of student engagement in American community colleges: Using the Community College Student Report in research and practice. *Community College Journal of Research and Practice*, 33(1), 1–24.
- Marton, F., & Säljö, R. (1976a). On qualitative differences in learning. I: Outcome and process. *British Journal of Educational Psychology*, 46, 4–11.
- Marton, F., & Säljö, R. (1976b). On qualitative differences in learning. II: Outcome as a function of the learner's conception of the task. *British Journal of Educational Psychology*, 46, 115–127.
- Marton, F., & Säljö, R. (1984). Approaches to learning. In F. Marton, D. J. Hounsell, & N. J. Entwistle (Eds.), *The experience of learning* (pp. 39–58). Edinburgh, UK: Scottish Academic.
- Mayhew, M. J., Seifert, T. A., Pascarella, E. T., Nelson Laird, T. F., & Blaich, C. (2012). Going deep into mechanisms for moral reasoning growth: How deep learning approaches affect moral reasoning development for first-year students. *Research in Higher Education*, 53, 26–46.
- McClenney, K. M. (2007). Research update: The Community College Survey of Student Engagement. *Community College Review*, 35(2), 137–146.
- McClenney, K. M., & Marti, C. N. (2006). *Exploring relationships between student engagement and student outcomes in community colleges: Report on validation research*. Retrieved from www.ccsse.org/publications on 6 Apr 2010.
- McCormick, A. C. (2009). Toward reflective accountability. In R. M. Gonyea & G. D. Kuh (Eds.), *Using NSSE in institutional research. New Directions for Institutional Research*, 141, 97–106.

- McCormick, A. C. (2011). It's about time: What to make of reported declines in how much college students study. *Liberal Education*, 97(1), 30–39.
- McCormick, A. C., Kinzie, J., & Korkmaz, A. (2011, April). *Understanding evidence-based improvement in higher education: The case of student engagement*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- McCormick, A. C., & McClenney, K. (2012). Will these trees ever bear fruit? A response to the special issue on student engagement. *The Review of Higher Education*, 35(2), 307–333.
- McCormick, A. C., Pike, G. R., Kuh, G. D., & Chen, P. D. (2009). Comparing the utility of the 2000 and 2005 Carnegie classification systems in research on students' college experiences and outcomes. *Research in Higher Education*, 50(2), 144–167.
- McDonough, P. M., Antonio, A. L., Walpole, M., & Perez, L. X. (1998). College rankings: Democratized knowledge for whom? *Research in Higher Education*, 39(5), 513–537.
- Merwin, J. C. (1969). Historical review of changing concepts of evaluation. In R. L. Tyler (Ed.), *Educational evaluation: New roles, new methods*. The sixty-eighth yearbook of the National Society for the Study of Education, Part II. Chicago: University of Chicago Press.
- National Center for Higher Education Management Systems. (1994). *A preliminary study of the feasibility and utility for national policy of instructional "good practice" indicators in undergraduate education*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- National Survey of Student Engagement. (2001). *Improving the college experience: National benchmarks for effective educational practice*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- National Survey of Student Engagement. (2003). *Converting data into action: Expanding the boundaries of institutional improvement*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- National Survey of Student Engagement. (2004). *Student engagement: Pathways to collegiate success*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- National Survey of Student Engagement. (2006). *Engaged learning: Fostering success of all students*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- National Survey of Student Engagement. (2007). *Experiences that matter: Enhancing student learning and success*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- National Survey of Student Engagement. (2008). *Promoting engagement for all students: The imperative to look within—2008 results*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- National Survey of Student Engagement. (2009a). *Assessment for improvement: Tracking student engagement over time—Annual results 2009*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- National Survey of Student Engagement. (2009b). *Using NSSE to assess and improve undergraduate education. Lessons from the field—Vol. 1*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- National Survey of Student Engagement. (2011). *Fostering student engagement campus wide—Annual results 2011*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- National Survey of Student Engagement. (2012). *Moving from data to action: Lessons from the field—Volume 2*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- Nelson Laird, T. F., Bridges, B. K., Morelon-Quainoo, C. L., Williams, J. M., & Salinas Holmes, M. (2007). African American and Hispanic student engagement at minority serving and predominantly White institutions. *Journal of College Student Development*, 48(1), 1–18.
- Nelson Laird, T. F., & Niskodé-Dossett, A. S. (2010). How gender and race moderate the effect of interactions across difference on student perceptions of the campus environment. *The Review of Higher Education*, 33(3), 333–356.
- Nelson Laird, T. F., Shoup, R., & Kuh, G. D. (2006). *Measuring Deep Approaches to Learning Using the National Survey of Student Engagement*. Paper presented at the annual meeting of the Association for Institutional Research, Chicago, IL.

- Nelson Laird, T. F., Shoup, R., Kuh, G. D., & Schwarz, M. (2008). The effects of discipline on deep approaches to student learning and college outcomes. *Research in Higher Education*, 49(6), 469–494.
- Newmann, F. P. (Ed.). (1992). *Student engagement and achievement in American secondary schools*. New York: Teachers College Press.
- Ouimet, J. A., Bunnage, J. C., Carini, R. M., Kuh, G. D., & Kennedy, J. (2004). Using focus groups, expert advice, and cognitive interviews to establish the validity of a college student survey. *Research in Higher Education*, 45(3), 233–250.
- Ouimet, J. A., & Smallwood, R. A. (2005). Assessment measures: CLASSE—The class-level survey of student engagement. *Assessment Update*, 17(6), 13–15.
- Pace, C. R. (1964). *The influence of academic and student subcultures in college and university environments*. Los Angeles, CA: University of California, Los Angeles.
- Pace, C. R. (1969). An evaluation of higher education: Plans and perspectives. *Journal of Higher Education*, 40(9), 673–681.
- Pace, C. R. (1979). *Measuring outcomes of college: Fifty years of findings and recommendations for the future*. San Francisco: Jossey-Bass.
- Pace, C. R. (1980). Measuring the quality of student effort. *Current Issues in Higher Education*, 2, 10–16.
- Pace, C. R. (1982). *Achievement and the quality of student effort*. Washington, DC: National Commission on Excellence in Education.
- Pace, C. R. (1984). *Measuring the quality of college student experiences*. An account of the development and use of the College Student Experiences Questionnaire. Los Angeles: Higher Education Research Institute.
- Pace, C. R. (1985). *The credibility of student self-reports*. Los Angeles, CA: Center for the Study of Evaluation, University of California.
- Pace, C. R. (1998). Recollections and reflections. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 13, pp. 1–34). New York: Agathon.
- Padgett, R. D., Goodman, K. M., Johnson, M. P., Saichaie, K., Umbach, P. D., & Pascarella, E. T. (2010). The impact of college student socialization, social class, and race on need for cognition. *New Directions for Institutional Research*, 145, 99–111.
- Paris, D. (2011). *Catalyst for change: The CIC/CLA consortium*. Washington, DC: Council of Independent Colleges.
- Pascarella, E. T. (1985). College environmental influences on learning and cognitive development: A critical review and synthesis. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 1). New York: Agathon.
- Pascarella, E. T., Seifert, T. A., & Blaich, C. (2010). How effective are the NSSE benchmarks in predicting important educational outcomes? *Change*, 42(1), 16–22.
- Pascarella, E. T., & Terenzini, P. T. (1991). *How college affects students: Findings and insights from twenty years of research*. San Francisco: Jossey-Bass.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research* (Vol. 2). San Francisco: Jossey-Bass.
- Peters, T. J., & Waterman, R. H. (1982). *In search of excellence: Lessons from America's best-run companies*. New York: Harper & Row.
- Pike, G. R. (1995). The relationship between self reports of college experiences and achievement test scores. *Research in Higher Education*, 36, 1–22.
- Pike, G. R. (1999). The effects of residential learning communities and traditional residential living arrangements on educational gains during the first year of college. *Journal of College Student Development*, 40, 269–284.
- Pike, G. R. (2000). The influence of fraternity or sorority membership on students' college experiences and cognitive development. *Research in Higher Education*, 41, 117–139.
- Pike, G. R. (2006a). The convergent and discriminant validity of NSSE scalelet scores. *Journal of College Student Development*, 47(5), 551–564.
- Pike, G. R. (2006b). The dependability of NSSE scalelets for college-and department-level assessment. *Research in Higher Education*, 47(2), 177–195.

- Pike, G. R. (2011). Using college students' self-reported learning outcomes in scholarly research. In S. Herzog & N. A. Bowman (Eds.), *Validity and limitations of college student self-report data. New Directions for Institutional Research*, 150, 41–58.
- Pike, G. R., & Killian, T. (2001). Reported gains in student learning: Do academic disciplines make a difference? *Research in Higher Education*, 42, 429–454.
- Pike, G. R., & Kuh, G. D. (2005a). First- and second-generation college students: A comparison of their engagement and intellectual development. *Journal of Higher Education*, 76, 276–300.
- Pike, G. R., & Kuh, G. D. (2005b). A typology of student engagement for American colleges and universities. *Research in Higher Education*, 46(2), 185–209.
- Pike, G. R., Kuh, G. D., & Gonyea, R. M. (2007). Evaluating the rationale for affirmative action in college admissions: Direct and indirect relationships between campus diversity and gains in understanding diverse groups. *Journal of College Student Development*, 48(2), 1–17.
- Porter, S. R. (2011). Do college student surveys have any validity? *The Review of Higher Education*, 35(1), 45–76.
- Reschly, A. L., & Christenson, S. L. (2012). Jingle, jangle, and conceptual haziness: Evolution and future directions of the engagement construct. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 3–19). New York: Springer.
- Saltmarsh, J., & Hartley, M. (Eds.). (2011). *"To serve a larger purpose": Engagement for democracy and the transformation of higher education*. Philadelphia, PN: Temple University Press.
- Seifert, T. A., Goodman, K. M., Lindsay, N., Jorgensen, J. D., Wolniak, G. C., Pascarella, E. T., & Blaich, C. (2008). The effects of liberal arts experiences on liberal arts outcomes. *Research in Higher Education*, 49(2), 107–125.
- Smith, K. A., Sheppard, S. D., Johnson, D. W., & Johnson, R. T. (2005). Pedagogies of engagement: Classroom-based practices. *Journal of Engineering Education*, 94(1), 87–102.
- Study Group on the Conditions of Excellence in American Higher Education. (1984). *Involvement in learning: Realizing the potential of American higher education. Final report of the Study Group on the Conditions of Excellence in American Higher Education*. Washington, DC: National Institute of Education.
- Terenzini, P. T. (1996). Rediscovering roots: Public policy and higher education research. *The Review of Higher Education*, 20(1), 5–13.
- Thacker, L. (2008). Pulling rank. *New England Journal of Higher Education*, 22(4), 15–16.
- Thompson, N. (2000, September). Playing with numbers: How U.S. News mismeasures higher education and what we can do about it. *The Washington Monthly*, 32(9), 16–23.
- Tinto, V. (1975). Dropouts from higher education: A theoretical synthesis of the recent literature. *Review of Educational Research*, 45, 89–125.
- Tinto, V. (1986). Theories of student departure revisited. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 11, pp. 359–384). New York: Agathon.
- Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago: University of Chicago Press.
- Tourangeau, R., Rips, L., & Rasinski, K. (2000). *The psychology of survey response*. Cambridge: Cambridge University Press.
- Wolf-Wendel, L., Ward, K., & Kinzie, J. (2009). A tangled web of terms: The overlap and unique contribution of involvement, engagement, and integration to understanding college student success. *Journal of College Student Development*, 50(4), 407–428.
- Zhao, C., & Kuh, G. D. (2004). Adding value: Learning communities and student engagement. *Research in Higher Education*, 45, 115–138.
- Zlotkowski, E. (1997). Service learning and the process of academic renewal. *Journal of Public Service and Outreach*, 2(1), 80–87.

Chapter 3

From When and Where I Enter: Theoretical and Empirical Considerations of Minority Students' Transition to College

Deborah Faye Carter, Angela Mosi Locks, and Rachelle Winkle-Wagner

Students' first enrollment in higher education institutions is a period presented with "unbridled optimism, exciting challenges, and myriad opportunities" (Yosso, Smith, Ceja, & Solórzano, 2009, p. 659). For traditional-aged college students, the years of college enrollment include a period of significant personal and intellectual growth. Late adolescents who go away to college learn to manage their finances, course choices, friendships, and relationships with family and faculty in a more complex environment than was typically demanded of them in high school. Alongside the well-acknowledged experiences of students of "traditional age," there are growing numbers of "nontraditional" students beginning college—students who are older, part-time, commuter, and who have roles as a partner/spouse or parent (McAtee & Benschoff, 2006; Schaefer, 2010).

Despite the optimism, opportunities, and challenges posed by entry into higher education institutions, a large number of students who enroll in college expecting to earn a baccalaureate degree do not return for a second year of higher education. This

D.F. Carter, Ph.D. (✉)
School of Educational Studies, Claremont Graduate University, 150 E. 10th Street,
Harper 202, Claremont, CA 91711, USA
e-mail: deborahfaye.carter@cgu.edu

A.M. Locks, Ph.D.
Student Development in Higher Education, College of Education, California State University,
1250 Bellflower Blvd. MS 2201, Long Beach, CA 90840, USA
e-mail: angela.locks@csulb.edu

R. Winkle-Wagner, Ph.D.
Educational Leadership and Policy Analysis, University of Wisconsin, 1000 Bascom Mall,
253 Education Building, Madison, WI 53701, USA
e-mail: winklewagner@wisc.edu

number of students who do not persist to the second year has varied over the years with the estimates being one-third of students who attended college in the late 1980s (Horn & Carroll, 1998) to one-fifth (21%) of full-time students and half (55%) of part-time students who started college in 2009 (Aud et al., 2012). For students of color, the most recent data reported by the National Center for Educational Statistics (NCES) on first-year college persistence, which does not include data for Native American and Asian American students, noted that 55% of African American students, in comparison to 40% of Hispanic students and 42% of White students attending college in 1989, interrupted their studies some time before the second year (Horn & Carrol, 1998). Higher education institutions have struggled with the question of how to address the needs of first-year college students, who can have quite varied backgrounds, experiences, and skills (Inkelas & Soldner, 2011). Helping students persist from the first to the second year of college is an issue many institutions have confronted for decades, and the overall baccalaureate-degree persistence rate (combining part- and full-time student data) has not significantly improved over the past few years. This is particularly problematic for students of color, given that their persistence rates remain below those of White students (Aud et al., 2012).

Since there is a large proportion of baccalaureate aspirants who drop out of college without completing a bachelor's degree, many consider the first year of college to be a particularly critical time for institutional intervention to increase persistence. Administrators and policymakers have shown alarm at such high proportions of students not completing their degrees. In recent decades, researchers, campus practitioners, and faculty have attempted to improve student experiences in college, focusing on student learning outcomes and student peer and faculty support, increasing advising and academic support, and tutoring in the interest of helping students better adjust to college demands. In the quest for improving college student transition and degree completion outcomes, colleges and universities have implemented different programmatic models for first-year transition programs and initiatives (Li, McCoy, Shelley, & Whalen, 2005; Sankar & Raju, 2011). There has been significant growth of first-year transition programs and initiatives designed to improve student experience and the persistence toward 4-year degrees. Such growth has been attributed to specific concerns regarding student persistence as well as broader concerns regarding the quality of undergraduate education and how postsecondary institutions should best respond to the increasing diversity of the student populace (Inkelas & Soldner, 2011).

Against this backdrop of broad concern for successful student transition into and completion of college, there remain specific critical concerns regarding the college transition of people of color. Pew Research Center estimates that people of color will be the majority by 2050 (Passel & Cohn, 2008). In 2010, these students were 46% of students in K-12. According to its analyses of population shifts and predictions of future behavior, one growth area for the US population will be a greater increase in immigrants and the children of immigrants. Despite these projections, domestic US citizens of these racial/ethnic groups continue to be underrepresented in college attendance and college completion, with the recent exception of some Asian American ethnic groups. Therefore, if colleges hope to improve their retention rates, a greater understanding of the transition experiences of these different racial/ethnic groups will be necessary.

Researchers have investigated student transition to college a number of ways, using different disciplinary lenses and examining distinct aspects of students' experiences. In this chapter, we review investigations of students' transition to college that have their foundations in psychology, sociology, and anthropology. In addition to these extensive research-based investigations into transition to college, practitioners have developed and implemented a number of campus programs to assist in students' successful completion of the early years of college (Li, et al., 2005; Sankar & Raju, 2011). The focus of this chapter is on the transition experiences of four racial/ethnic groups (Asian American, Latina/o, African American, and Native American) in higher education institutions. We discuss 4- and 2-year institutions since there are unique challenges for students of color within both types of institutions. Although we discuss "students of color" as a group, we acknowledge that Asian American, Latina/o, African American, and Native American students each have their own challenges and opportunities when it comes to college transitions, and there are significant differences within each racial/ethnic group with regard to how students experience higher education institutions and the transition to 4-year institutions.

Despite differences between the racial/ethnic groups, there are some similarities across groups in terms of their experiences in predominantly White institutions in particular. One thing that unites these groups is that dominant literature on college student outcomes tends to focus on White students' outcomes and experiences, which may differ in significant and material ways from the experiences of students of color. For example, students of color are more likely than White students to experience racial harassment and feel isolated on campus due to their race or ethnicity (Solórzano, Ceja, & Yosso, 2000; Yosso et al., 2009). Similarly, students of color are more likely to experience stress related to managing ties to their communities of origin in comparison to White students (Cano & Castillo, 2010; Winkle-Wagner, 2009b).

For the purpose of this chapter, we define "transition to college" as students' first-time college attendance post-high school diploma or certification. Inclusive in this definition are students who have baccalaureate-degree intentions but whose first institution post-high school may be 2- or 4-year institutions. In this chapter, we include research regarding students attending higher education institutions, part- and full-time, and nontraditional student concerns. The processes by which students enter and stay ("when and where they enter") in the institutions differ substantially, but we think that discussion of both is imperative for understanding ways institutions may assist in increasing degree completion and improving students' experiences. This chapter covers the literature of students' first-year college experiences and does not address in great detail issues related to college access and attendance since there are other reviews that cover these topics (e.g., Perna, 2006; Perna & Titus, 2004, 2005; Tierney & Hagedorn, 2002). A final note about the scope of the literature reviewed in this chapter: We emphasize recent literature on students' transition and adjustment to college, but in some instances, we refer to key literature that predates the substantial growth of students of color because this scholarship provides the foundation of our current understanding of student transition.

Anna Julia Cooper, leading African American scholar and activist in the late nineteenth and early twentieth centuries, emphasized the role of African American

women in the quest for racial equality and progress. Speaking as an advocate for equal treatment of African American people at a time of fierce discrimination, Cooper advocated for the unique contribution of Black women's voices for racial uplift, recognizing the role of power and agency in fighting for equality (Giddings, 1996, preface). We take Cooper's words, "when and where I enter," as a reminder that when considering the transition to college of students of color, student agency is an important element of their experiences. Their disparate college attendance and persistence rates have remained a significant issue for decades and deserve continued attention and investigation now.

Approach to the Review

To create our pool of studies for analysis, we used search engines such as JSTOR, ERIC EBSCO, PsychInfo, Project Muse, Sociological Abstracts, and Google Scholar. On each of these search engines, we initially searched terms such as *transition*, *adjustment*, *adaptation*, *college*, *first-year*, *freshman*, *higher education*, *African American*, *Black*, *Latino*, *Hispanic*, *Native American*, *American Indian*, and *Asian American*. We also completed searches in specific journals such as the *Journal of First Year Experiences and Students in Transitions* and *Journal of Student Financial Aid*. After gathering a preliminary pool of studies, we then focused our search on the main ways in which the published work represented scholarly understanding of transition to college for students of color. We limited our collection of studies to peer-reviewed journal articles, scholarly books, and edited books.

Based on the analysis, we found that the dominant thrust of much of the scholarship (especially that relating to theory testing and development) on transition to college for students of color has its foundation in psychology. That is, quite a lot of the literature on transition to college focuses on students' individual psychological responses to being in new collegiate environments. In addition, there is a significant but less prominent area of research with sociological foundations on student transition to college. Our analysis of the scholarship revealed many overlaps between the work related to secondary education and the work on higher education. We therefore attempt to connect educational experiences in primary and secondary education with early college experiences in order to demonstrate the way that prior educational experiences may influence the way that students transition into college.

From our review of the literature, there seem to be four main themes regarding the barriers to students of color successfully adjusting to 4-year colleges and universities in the literature, which we include below with sample references. A longer discussion of each area follows:

- (a) *Financial barriers*: For students of color, financial barriers have been shown to have a negative effect on adjustment (Hurtado et al., 2007). Students of color who are low-income are particularly less likely to become involved in campus life, which may affect students' persistence into their second year of college (Bozick, 2007; Cabrera, Nora, & Castaneda, 1992; St. John, 1991; St. John & Noell, 1989).

- (b) *Academic preparation*: Many students of color are disproportionately placed into lower academic tracks in K-12 schooling that are less focused on academic preparation for college (O'Connor, Mueller, Lewis, Rivas-Drake, & Rosenberg, 2011; Rubin, 2003; Yonezawa, Wells, & Serna, 2002).
- (c) *Negative racial climate at predominantly White institutions (PWIs)*: Students of color attending PWIs tend to experience a lack of support from colleges and universities that specifically manifests itself as negative experiences with the racial climate that affect their academic, social, personal-emotional adjustment, and attachment to college (Hurtado, Carter, & Spuler, 1996).

On the flip side, there is consensus regarding what seems to support students' positive acclimation to campus for students of color:

- (a) *On-campus mentoring and first-year experience programming* by faculty and/or staff (Rendón, 2002; St. John, 2012).
- (b) *Peer support* from other students of color students individually and through student groups (Martinez Alemán, 2010; Terenzini et al., 1994).
- (c) *Family and community support*: Students of color who do not sever ties with their families have been shown to have a more successful college transition process (Cabrera, Nora, Terenzini, Pascarella, & Hagedorn, 1999; Mattanah, Hancock, & Brand, 2004; Rice, Fitzgerald, Whaley, & Gibbs, 1995; Schneider & Ward, 2003; Soucy & Larose, 2000; Winkle-Wagner, 2009b).
- (d) *Adequate financial aid* (Ruiz, Sharkness, Kelley, DeAngelo, & Pryor, 2010; Sanchez, Esparza, Colon, & Davis, 2010).
- (e) *Positive racial climate*: reduction in isolation and negative racial climate (Hurtado et al., 1996; Locks, Hurtado, Bowman, & Oseguera, 2008).
- (f) *Academic support and assistance*: specifically focusing on positive student-faculty interactions, tutoring, remediation for lacking academic preparation, and positive classroom experiences (Rendón, 2002; St. John, 2012).

We begin with an overview of traditional and emergent theories relative to college transitions. Then, we explore academic experiences, including issues such as the influence of family and community, precollege academic experiences, and early academic experiences in college. Next, we examine the role of finances in the transition to college. Finally, we offer some ideas for future research and implications emerging from this chapter.

Traditional Theories and Approaches to the Transition to College

Much of the research and theory on students' transition focuses on the "traditional" pathway of students entering 4-year colleges and universities soon after graduating from high school. The theoretical and empirical perspectives regarding the college student transition process can be categorized into two primary groups: socialization models and psychological approaches. *Socialization* models of transition refer to

the studies in which Tinto's Theory of Student Departure (1987, 1993) is dominant among the conceptualizations. Tinto's (1987) theory includes a discussion of transition to college processes based on Van Gennep's (1960) work, and many authors have adopted the theory or parts of the theory to discuss student transition to college. Some of the applications of Tinto's theory has also included a critique of the transition to college processes and their relevance to the experiences of students of color in predominantly White college settings (e.g., Tierney, 1992).

The second category of research is composed of psychological perspectives, particularly concepts such as self-efficacy, motivation, and metacognition. The focus of the empirical research using a psychological perspective is on survey methods using the Student Adaptation to College Questionnaire (SACQ) (Baker & Siryk, 1980, 1984, 1989). The empirical research using the SACQ often examines how individual students adapt to college and manage their new responsibilities and roles and assesses different dimensions of students' first-year college experiences. Another main characteristic of much of the research using the SACQ is its lack of strong theoretical grounding or analysis of the causal relationships between concepts and ways in which concepts are operationalized. We discuss these two groups of research in more detail below.

Socialization and Integration for Students of Color

Tinto's Theory of Student Departure (1987, 1993) describes the roles that student interactions with peers and faculty, their intentions and plans, and student backgrounds play in students' deciding to leave or stay in a college or university. Researchers have described Tinto's theory as "interactionalist" (Braxton, Sullivan, & Johnson, 1997) and featuring "socialization process[es]" (Berger & Milem, 1999) because a key feature of the theory is the way in which students interact with faculty and the higher education institution as an organization. Since Tinto's theory has become paradigmatic in status, not only in framing student dropout behavior, but also in framing other outcomes (Braxton et al. 2004), researchers have used different aspects and elements of the model to explain how students adjust to college. For example, Braxton et al. use "interactionalist" to mean that students interact with the higher education institution and take meaning from those interactions that lead to specific behaviors. In contrast, Berger and Milem consider Tinto's model as representing "socialization processes," because students are socialized to college life, their disciplines, and majors through the influence and direction of faculty. Since so few students (less than one-third) have had significant interaction with faculty members in the course of their college careers (National Survey of Student Engagement [NSSE], 2009), it is not clear whether faculty are socializing the majority of college students.

The tensions embedded in having different conceptions of the way Tinto's theory explains student transition to college may also relate to the lack of coherence in our theoretical understanding of student transition to college. Even using the same theory, researchers do not apply the same description of mechanisms that affect students'

adjustment to college. What follows is a discussion of Tinto's theory and Tinto's use of Van Gennep's anthropological ideas to explain the role of transition to college in the process of student persistence. Subsequently, we discuss classic critiques of Tinto's theory before discussing research based on the SACQ that draws on the theory.

Tinto and Socialization Models of the Student Transition Process

"Socialization" models of college student transitions refer to the perspective that individuals enter environments and learn to adjust (or are socialized) to these environments. Socialization is a clearly expressed or implied factor of students' transition to college, and depending on a researcher's disciplinary lens, socialization can refer to how individuals learn about an educational setting or organization (college or university), how individuals learn about a particular major or future profession linked to a major/discipline, or can include how individuals "adapt to the roles he or she is called upon to play in society" (Smith, Carmack, & Titsworth, 2006).

A key element and assumption of "socialization" paradigms is the degree to which this means that those from ethnic minority groups must change in order to behave in "approved" ways by White racial majority of staff and faculty PWIs. Although many researchers believe an important part of socialization is individual agency and how the individual responds to an institution's attempt to shape the individual (Smith et al., 2006), most of the research discussed in this section does not take this explicit stance toward individual agency. A more thorough discussion of this issue occurs later in the chapter under the heading of "Acculturation Models."

Socialization models focus on the individual student as the method of analysis. One major socialization model is Tinto's model of student departure. Tinto's model of student departure (1975, 1987, 1993) has been the most often used theoretical framework for examining predictors of attainment and persistence. Building upon the research of Spady (1970, 1971), Tinto proposed a model of student departure that was initially based on the sociological concept of suicide as proposed by Durkheim (1951). Durkheim (1951) asserted that suicide is more likely to occur when an individual is not sufficiently integrated into society. Tinto (1975) found this concept analogous to the departure of students from colleges and universities. He suggested that when college students are not sufficiently integrated, or if they maintain values that are sufficiently different from the college they are attending, they are more likely to withdraw or dropout.

Tinto's Adaptation of Van Gennep

In trying to explain how students might become integrated into the academic and social systems of college, Tinto (1987) adapts Van Gennep's (1960) conception of "rites of passage" to explain the mechanisms by which students may be successfully integrated into a college or university. Tinto justified the use of Van Gennep's

work because Van Gennep focused on how adolescents became “adults” in tribal societies, and this process seemed to be analogous to the processes that traditional-aged college students encounter when they begin college as part of a ritual in our society.

According to Van Gennep, members of tribal societies need to work through three phases as they move into adulthood—separation, transition, and incorporation. Tinto argued that this theory was useful because Van Gennep focused on how individuals reacted to life challenges and how they navigated dynamic social memberships and moving in, out, and through various group memberships. Tinto posited that there are inherent “rites of passage” on college campuses that are a necessary component of successful academic and social integration. He believed that students who persist in degree programs work through these phases, while students who withdraw are not successful at working through these phases. Tinto applied Van Gennep’s notion of the “rites of passage” to the integration process that occurs in the college community. Tinto likened the college environment to a small society with its own norms, beliefs, values, and sanctioned behaviors. By this analysis, student decisions to persist or drop out came as the result of their learning and adapting to the norms of the college and university.

The “separation” phase of students’ transition to college involved students’ separating themselves from family and friends in their home high school environment. The distancing process is an important part of a successful transition, in Tinto’s view, because students needed to adapt to new norms and values of the college or university (Tinto, 1987). Tinto noted that the process could be traumatic for some students and that this process may be more difficult for students who attend college farther away from home but less difficult for those who are living in their home communities.

Tinto defined the *transition* phase as the part of the college student’s experiences when they begin to separate from their families and communities but have not yet been fully exposed or adapted to college norms and behaviors. Tinto asserted that the degree of difficulty students experienced with their transition process was dependent upon how closely aligned their precollege norms and behaviors were with those required in the college environment. He noted that disadvantaged students, minority students, nontraditional-aged students, those with psychological disabilities, and students from rural backgrounds at large institutions were more likely to have precollege life experiences and behaviors incongruent with the college environment. Van Gennep’s model was intended to explain membership in traditional society; as such, it is an imperfect analogy to the process of why students voluntarily leave their institutions.

Integration, “Rites of Passage,” and Acculturation

An assumption of this application of Van Gennep’s transition stage to college student departure is that the primary responsibility for adjusting to college rested with the student. Additionally, this application assumes that an adaptation of college

norms and values is good and positive. For some students, maintaining a balance between their families and home communities and college life may provide them with the appropriate support and affirmation needed to adjust to college successfully. If students must sever ties from family and home communities more completely, those students whose values do not readily align with those of their campus may need a niche on campus that affirms their previous life experiences but that also promotes feeling connected to the campus. This misalignment from campus values underscores how important positive interactions with faculty, administrators, staff, and other students are in helping them navigate the separation-transition phase. Such an application of Van Gennep does not account, however, for the infrastructures that may inhibit students' successful transition to college.

Early critiques of Tinto's theory popularized by Tierney (1992, 1998) and subsequently argued by other scholars (e.g., Yosso et al., 2009) relate to how students of color can transition to campus while also maintaining their sense of racial or ethnic identity. The discussion of student "adjustment to college" brings to mind a framework of students' socialization into higher education institutions. Students are thought of as needing to learn, adopt, and meet the expectations and culture of higher education institutions in order to "be successful" in terms of earning a high grade point average and/or persisting to degree completion. A central conflict in the literature on first-year college students of color (as well as on those who are first-generation students regardless of racial/ethnic background) in higher education is the degree to which such students can enter into higher education institutions and be successful, while maintaining relationships and values from their home communities and cultures (Schneider & Ward, 2003; Soucy & Larose, 2000; Winkle-Wagner, 2009b).

More recent sociological work on students of color often uses an acculturation, biculturation framework for understanding how students of color become part of predominantly White college and university communities. Cano and Castillo (2010) provide one example of this point of view. They define *acculturation* as "an individual's process of learning about and adopting White American cultural norms and the degree to which the person maintains his or her heritage culture" (p. 222). In addition to acculturation, researchers have used the term *enculturation* to refer to "the process of socialization (or resocialization) into and maintenance of the heritage culture norms" (p. 222). This tension between adopting the norms and values of a predominantly White institution while attempting to maintain connection to one's home norms and values may be stressful for students and such stress may be related to persistence (Cano & Castillo, 2010). Similarly, scholars of communication studies note that first-generation college students and students of color at predominantly White institutions adopt different communication strategies for college than for their families at home and sometimes within different settings at college (Orbe & Groscurth, 2004).

Researchers have discussed that there is some disagreement with regard to how much stress students of color encounter as they are socialized into predominantly White environments. Scholars have hypothesized that racial/ethnic identity may affect how students experience the stress of the university environment (Anglin & Wade, 2007; Chavous et al., 2003; Rowley, Sellers, Chavous, &

Smith, 1998; Sellers, Chavous, & Cooke, 1998; Winkle-Wagner, 2009a). Racial/ethnic identity may affect successful student adjustment in many ways: (a) Those students who take pride in their racial/ethnic backgrounds may find this positive feeling serves as a protective effect against a negative racial climate toward their group, (b) students who have a strong relationship and association with White students and individuals in PWI settings may be better able to adjust to such campus settings because they already have knowledge of White cultural norms, and (c) students of color who maintain connections with family members from their home communities may feel less isolated and more able to maintain aspects of their identities while experiencing a new environment (Cabrera, Nora et al., 1999; Mattanah et al., 2004; Rice et al., 1995; Schneider & Ward, 2003; Soucy & Larose, 2000; Winkle-Wagner, 2009b).

Cano and Castillo (2010) attempted to examine the tension of whether bicultural orientation means more (or less) stress for individuals by using a bilinear model of acculturation “that takes into account both acculturation and enculturation” (p. 223). One of the ways that a bilinear model can add to an understanding of students’ adjustment is that such a model can take into account student behaviors and attitudes toward their home communities/racial groups and their behaviors and attitudes in the dominant culture of a PWI institution. Cano and Castillo found that “Latina college students who do not perceive themselves as exhibiting or practicing behaviors associated with Latino culture are at a higher risk for distress” (p. 227).

Iturbide, Raffaelli, and Carlo (2009) studied whether Latina/os’ ethnic identity would have a protective factor in situations where the students experienced “acculturative stress.” Such stress indicates the degree to which individuals feel uncomfortable about being a minority group member, in this case in a predominantly White setting. In their study, they found that having a strong, positive ethnic identity and feelings of belonging to one’s racial/ethnic group can serve as a protective factor in situations where there is low acculturative stress. In situations that were highly stressful, however, ethnic identity provided very little protective effect. One notable finding from the authors is that the effect of racial identity differed between the men and women in the sample. Men tended to experience a protective effect from having an “other group orientation.” That is, men who had greater involvement with other racial/ethnic groups tended to experience some buffer from low acculturative stress situations, while women who experienced affirmation and belonging regarding their own ethnic group were buffered against the negative effects of stress. In other words, the Latinos in the study tended to gain support from interactions with people of other racial/ethnic groups while the Latinas in the study tended to gain support from interactions with people of their same ethnic group. The implications of the study support previous research that a more salient racial/ethnic identity may not only help students of color cope with predominantly White college environments but also point toward racial/ethnic identity as a protective shield against negative racial climates and experiences. The findings of this study also suggest that coping mechanisms that may differ across women and

men, especially in the ways they attain support from same race or other race groups on campus.

The Strengths and Limitations of Socialization Models

Research using Tinto's framework has contributed a great deal to the understanding of what affects student dropout/departure and student persistence. Tinto (1993) proposed that the occurrence of college student departure provides a window on the social and academic communities in which students experience colleges and universities. Several researchers have recognized the utility of the Tinto model in predicting college student attrition (Braxton et al., 1997; Getzlaf, Sedlacek, Kearney, & Blackwell, 1984; Pascarella & Terenzini, 1980). Researchers have utilized these concepts for understanding a variety of topics from college choice (Stage & Rushin, 1993) to student growth and development (Terenzini & Wright, 1987).

Over the years, researchers have challenged Tinto's model for its limited applicability to minority students (Braxton et al., 1997; Tierney, 1992). Using the example of a Native American student, Tierney disagreed with the adaptation of anthropological concepts—such as the rituals of transition—in the Tinto model. According to Tierney, "...rituals of transition have never been conceptualized as movements from one culture to another" (p. 611). He maintained that the Tinto model makes assumptions regarding individuals undergoing a rite of passage in a culture that might or might not be their own (e.g., minority students within predominantly White institutions). An additional challenge extended by Tierney is that "essentially models of integration have the effect of merely inserting minorities into a dominant cultural frame of reference that is transmitted within dominant cultural forms, leaving invisible cultural hierarchies intact" (p. 611).

Braxton et al. (1997) addressed the nine testable propositions derived from Tinto's model in terms of aggregated support, support by institutional type, and support by student group. They proposed that in the future, researchers may want to assess these propositions using different student ethnic/racial groups. Based on the limited sample sizes and small effect sizes of reviewed literature using Tinto's theory, Braxton et al. concluded that "the empirical internal consistency of Tinto's theory is indeterminate for both African Americans and Native Americans/Alaskan natives" (pp. 134, 158). They suggested engaging in theory revision and/or using other theoretical perspectives for studying the retention of racial/ethnic minority group members. Furthering Tierney and Braxton et al.'s comments, the issue in using Tinto's theory to study minority student transition is in part a theoretical one. Tinto posits that students stay based on how well they are integrated into the social and academic systems of their college or university. However, it is difficult for minority students in hostile campus racial climates to integrate into the social and academic systems. For example, Allen's (1991) work with African American students in predominantly White institutions maintains, "Instead of being at one with the educational system, [minority students] have found themselves at odds with that system" (p. 12).

Weidman's Theory of Student Socialization

In addition to Tinto, Weidman's (1989) model and subsequent work (Weidman, 2006) has been used by some scholars interested in students' first-year transition to college and college persistence (Berger & Milem, 1999; Cruce, Wolniak, Seifert, & Pascarella, 2006). Weidman (1989) developed a model of undergraduate socialization that takes into account the social-structural aspects of the socialization process. Weidman's model specifies the social processes in college that affect the outcomes of students: Students enter college with certain aspirations, values, and aptitudes. Then, they are exposed to the socializing influences of faculty and peers through the academic and social normative contexts of the postsecondary institution. After such exposure, students assess the importance of the various normative pressures for attaining their goals and then change or maintain the "values, aspirations, and personal goals that were held at college entrance" (p. 301). Weidman mentions that students' socialization in colleges and universities can be affected by their race/ethnicity and that "it is necessary to adapt conceptual frameworks to the differing patterns of socialization that may be represented among specific ethnic and gender groups" (p. 313). Berger and Milem (1999) emphasized the aspect of Weidman's model that focused on how the formal and informal interactions with peers and faculty play out in students' first-year college experiences, finding that students who were most like the dominant peer group on campus were more likely to persist and, contradicting Tinto's theory, "students who successfully integrate into the academic and social subsystems of a college do so not at the expense of their home backgrounds, but because of them." (p. 661).

Generally then, student adjustment to college has been examined mostly through the lens of student socialization. This is a useful framework but, as stated above, can be a limitation when examining minority students' experiences. Several years ago, Attinasi (1989) completed a qualitative study of Mexican-American students at an urban institution and concluded that the interactions with peers help students in "getting to know" the various university environments; social interactions help students to cognitively manage college environments, which positively affects persistence; and those who persist in college tend to employ strategies that encourage the development of cognitive maps of the university environment. A key contribution of his work is that Attinasi helped contextualize the experiences of first-generation Latina/o students and identified how they made sense of the transition to college process. Attinasi concluded "the extent and nature of anticipatory socialization for college going has an influence not only on the decision to go to college but, once there, on the decision to stay" (p. 269). Attinasi's (1989) research, together with quantitative investigations of Latino/a students' adjustment to college (e.g., Hurtado et al., 1996), seems to indicate that campus racial climates affect Latino students' adjustment and that persons external to the college environment also play a role in students' feeling comfortable in the college environment. In addition to the socialization models, the field of psychology has heavily impacted research on college student transitions. Next, we review studies from this psychological perspective.

Psychological Perspectives on Student Transitions

The field of psychology has had a major influence on the literature on college student adjustment to college. One of the main theories that take a psychological approach is Schlossberg's transition theory (1981, 1984) which is reviewed below. Much of the empirical literature features coping, self-efficacy, and attachment and motivation theory as the basis for their studies.

Transition Theory

Schlossberg's transition theory (1981, 1984) was developed out of Schlossberg's counseling practice as a psychological theory aimed at understanding adults' general life transitions and coping strategies. One of the primary arguments of Schlossberg's work was that different individuals may react quite differently to change (Schlossberg, 1981). This adult transition theory was later expanded to focus on college student transition processes specifically (Schlossberg, Waters, & Goodman, 1995). Schlossberg and colleagues define the general notion of transition as "...any event, or non-event that results in changed relationship, routines, assumptions, and roles..." (Schlossberg et al., 1995, p. 27). Linking the concept of transition to adaptation, Schlossberg (1981) defined adaptation as "a process during which an individual moves from being totally preoccupied with the transition to integrating the transition into his or her life" (p. 7). One of the differences between transition and adaptation, according to Schlossberg, is that adaptation is dependent on the way that individuals perceive their amount of resources to the amount of barriers. Thus, the study of transitions, according to Schlossberg's initial line of thinking, should account for understanding three factors: the transition itself, the environment where a transition occurs, and the characteristics of the person undergoing the transition.

These initial three factors were later expanded into what Schlossberg and her colleagues (Chickering & Schlossberg, 1995; Schlossberg et al., 1995) called the four S's: situation, self, support, and strategies. These four S's are meant to be considered as overlapping and in combination with an understanding of the student's perception of resources and deficits/barriers (Chickering & Schlossberg, 1995). Each of the S's is explained below:

1. **Situation:** The study of the situation explores a students' perception of issues such as (a) the catalyst for the change, (b) the timing of the change and whether the students see the time as a good time for change, (c) the aspects of the change that are perceived to be within the student's control, (d) the changes to a student's roles and whether these are perceived as positive or negatives changes, (e) the duration of the transition (short-term change, long-term change, or permanent change), (f) the other stresses that are occurring concurrently, (g) the previous experiences that the student has had associated with the transition, and (h) who or what is seen as responsible for the transition.

2. **Self:** Self includes individual characteristics, demographic characteristics, and the psychological resources available. The study of the self includes such factors as gender, socioeconomic status, state of health, and age, alongside psychological resources such as optimism, self-efficacy, and values.
3. **Supports:** Either positive or negative, supports focus on the way that relationships and networks influence a student's transition. These relationships include family, friends, coworkers, faculty, staff, or community/groups to which a person belongs.
4. **Strategies:** There are four strategies that could be studied within a student's transition: (a) information-seeking, (b) direct action, (c) inhibition of action, and (d) intrapsychic behavior.

While there is relatively little research that uses Schlossberg's transition theory to understand the college adjustment of students of color, this theory has been used in a few instances to better understand the college transition process for underrepresented students. For example, transition theory has been useful in investigations into issues such as first-year academic success for women of color (Bradurn, Moen, & Dempster-McClain, 1995; Rayle, Kurpius, & Arredondo, 2007), the college transitions of nontraditionally aged students (McAtee & Benschoff, 2006; Schaefer, 2010), or the transition of Latino students (Tovar & Simon, 2006).

Research using Schlossberg's transition theory sometimes uses the theory as a way to explore educational outcomes. For instance, in a study of students' transitions to community college, Tovar and Simon (2006) found that Latina/o students on academic probation were more likely to experience academic difficulties, more prone to leaving the institution, and more willing to receive institutional assistance as compared to students from other racial/ethnic backgrounds.

In addition to examining educational outcomes in a handful of studies, researchers have used Schlossberg's theory to examine the functions of social support on students' transitions. In a study using transition theory relative to first-year academic outcomes among women, Rayle et al. (2007) found that women of color were particularly affected by social supports (or a lack thereof); those having a lack of social support tended to have lower GPAs in comparison to White women. In a quantitative study using Schlossberg transition theory to explore rural, nontraditional-aged women who were transitioning back into community college, findings indicated that African American women reported much lower social support for continuing their education than did White women (Rayle et al., 2007).

While Schlossberg's (1981) initial theory was published decades ago, there have been relatively few applications of this theory to traditional-aged college student transitions for students of color (e.g., Bradurn et al., 1995; Rayle et al., 2007). Most of the work that has been on the transition for students of color is focused on nontraditional-aged students and women. This could be in part due to the genesis of the theory in counseling practice with adults (Schlossberg, 1981). Given that the theory was initiated out of counseling practice, there is space for research using this theoretical framework to have practical implications for ways to better support students of color. Future work could expand on this theory and test it specifically among racially underrepresented populations.

Student Adaptation to College Questionnaire

One of the primary instruments that has been used to empirically study college students' transition processes is the Student Adaptation to College Questionnaire. Baker and Siryk (1980, 1984, 1989) developed the Student Adaptation to College Questionnaire (SACQ) as a self-report, Likert-type, 9-point scale to assess student's adjustment to college. The SACQ measures adjustment to college across four dimensions: academic adjustment, personal-emotional adjustment, social adjustment, and attachment to the institution. The norms were derived from initial data collected at Clark University (Dahmus, Bernardin, & Bernardin, 1992). With the 67-item SACQ, the college adjustment process was conceptualized as multifaceted, and thus, the questionnaire could measure both students' difficulty or ease with the various areas of the college adjustment process. Baker asserted that there were two appropriate uses for this measurement tool: (1) as a source of dependent variables in studies of factors related to the student adjustment process and (2) to identify potentially at-risk students who are having difficulty in their adjustment to college.

Early studies using the SACQ focused on the examination of differential relationships between the four subscales and various events in students' experiences, which were presumed to involve the operation of the variables in the four subscales (Baker, 1986). Additional studies aimed at evaluating the SACQ as a measurement tool and legitimizing its validity and reliability (Baker, 1986; Kaase, 1994; Merker & Smith, 2001). As Baker (1986) suggested, the SACQ has primarily been used to identify dependent variables related to the student adjustment process and to identify students who are potentially at risk for attrition (Kaase, 1994; Krotseng, 1992; Schwartz & Washington, 2001). These four subscales could be used to mirror the four S's in Schlossberg's transition theory (Chickering & Schlossberg, 1995) with the academic and social adjustment scales relating to situation and support, the personal-emotional adjustment relating to the self, and the attachment to college and institution subscale relating to strategies. Krotseng argues that the SACQ can be used to assess Tinto's theory—emphasizing the importance of academic and social integration in the success of college students. Linked to retention efforts, the SACQ has aided in the development of institutional intervention and support programs for students (Dahmus et al., 1992). However, there is some evidence that the SACQ is not able to identify at-risk students in all institutional settings or geographic areas (e.g., a denominational liberal arts college in the Southeast; Kaase, 1994).

The SACQ has also been employed in others ways: to examine Latina/o college student experiences and the impact of campus climate on those experiences (Hurtado et al., 1996); a tool for mental health professionals working with college students (Dahmus et al., 1992; Merker & Smith, 2001); and to understand the adaptation of specific populations of students, for example, students in science and engineering (Cooper & Robinson, 1999). The SACQ has been successfully used in international settings to gauge students' adaptation to postsecondary setting. For example, Beyers and Goossens (2002) examined the usefulness of the SACQ in the European university context, and Tao, Dong, Pratt, Hunsberger and Pancer (2000) used the SACQ in a Chinese higher education context.

Using the SACQ to Understand the Transitions of Minority Students and Female Students

Researchers have used the SACQ to understand the transition process of underrepresented students to college and to suggest strategies for institutional support for minority students (Gold, Burrell, Haynes, & Nardecchia, 1990; Hurtado et al., 1996). There is evidence that different factors affect the adaptation to college for students of color. For example, Yazedjian, Toews and Navarro (2009) found that using the SACQ to examine the relationships of parental expectations on White and Latina/o student GPA showed differences between the racial/ethnic groups. Their regression models were robust for predicting the academic achievement of White students in the sample, but only one of the variables was a significant predictor for the Latina/o students. Similarly, other researchers have found differences between racial/ethnic groups. Kalsner and Pistole (2003) used the SACQ coupled with ethnic identity and parental attachment measurement tools to find relationships between college adaptation for students of color (Asian, Asian Indian, Latino/a, and African American) and attachment to families, ethnic identity, and separation-individuation. The researchers also noted that White students were not impacted by these factors in the same way.

Researchers have used the SACQ to study the adjustment processes and persistence of single racial/ethnic groups as well. Hurtado et al. (1996) used the SACQ to examine the factors affecting high-achieving Latino college student experiences in the first and second years of college, finding that in-college experiences affected Latino student adjustment more than background characteristics and experiences. Other research focusing on students of color tends to emphasize individual level variables such as student background and cognitive/affective variables rather than the campus environment in describing what affects student transition to college.

In an analysis of survey data generated from the SACQ, Schwartz and Washington (2001) found that high school rank and social adjustment predicted retention of African American men at a historically Black college. Additionally, Schwartz and Washington discuss their finding that social cognitive/affective variables, such as personality, responsibility, self-concept, academic self-concept, and locus of control, were useful in predicting retention, particularly for African American students.

There is also evidence of gender differences in college adjustment using the SAC: Kalsner and Pistole (2003) employed the SACQ in concert with the Parental Attachment Questionnaire (PAQ), the Multigenerational Interconnectedness Scales (MIS), and the Multigroup Ethnic Identity Measure (MEIM) and found that attachment was an issue for the adaptation of female students of color (African American, Latino, and Asian American). The results indicated a need for female students of color to individuate from their family during the adjustment to college (Kalsner & Pistole).

Strengths and Limitations of the SACQ

In general, the SACQ has been found to be a reliable measurement tool of college student adaptation, assessing both cognitive and social/emotional factors related to the college experience. However, more research is still needed to assess the

usefulness of the SACQ in different institutional types (Dahmus et al., 1992). Additionally, there is a need for more research using the SACQ on gender differences by race. The SACQ questionnaire is self-reported; thus, there is potential for differences in the way that students might respond to or interpret the questions. Cognitive interviews, asking the students to explain their interpretations of the questions, would be helpful in alleviating this limitation. The SACQ, in concert with other measures such as the Multigroup Ethnic Identity Measure (Kalsner & Pistole, 2003) or the Noncognitive Questionnaire-Revised (NCQ-R) (Schwartz & Washington, 2001), has been used to predict college success for students of color. However, because the SACQ is often used in conjunction with other instruments (e.g., Lapsley & Edgerton, 2002; Kalsner & Pistole, 2003), shared method variance presents a possible limitation. In other words, there needs to be more work analyzing the efficacy of using the SACQ with other instruments.

Summary of Socialization, Persistence, and Psychological Models

The aforementioned socialization models consider the academic and social integration of students during the transition process, positing that if students integrate academically and socially, they will likely persist through the transition process through to degree completion. However, there is some evidence that these models may not be well adapted to the needs and experiences of students of color (Yosso et al., 2009). The SACQ examines cognitive and social/emotional aspects of college student transitions, suggesting the need for support initiatives for students of color. The best results are perhaps obtained from the use of the SACQ in concert with other measures. Based on these traditional approaches to studying college student transitions, more recent scholarship has considered theoretical approaches that might be particularly useful for understanding the unique experiences of students of color.

Emergent Theories of College Transitions for Students of Color

There are a few emerging theories that are applicable to the college student transition process for students of color, two of which we review here: (1) academic capital formation and (2) validation models. These emergent theories have implications for research on college student transitions more generally.

Academic Capital Formation

St. John, Fisher and Hu (2011) developed the emergent theoretical framework of academic capital formation (ACF) over a decade of research on college access and opportunity. Based on evidence from studies of three comprehensive intervention

programs constructed to promote access and academic success for underrepresented students (the Twenty-first Century Scholars, Washington State Achievers, and Gates Millennium Scholars), ACF incorporates concepts from three theoretical traditions: cultural capital, social capital, and human capital (St. John et al.). By bringing together these theories, St. John and his colleagues postulated that attending college is *more* than just acquiring knowledge or skills (referring to the primary human capital argument); it is also deeply connected to the need to build social networks that provide resources (social capital) and to developing particular social or cultural competencies (cultural capital) that can then transfer to a students' advancement of social status. Academic capital formation could be particularly beneficial to research with students of color and low-income or first-generation students who are the first in their families to attend college because the academic capital theoretical apparatus fuses economic, social, and cultural aspects of social status acquisition. Specifically, St. John and colleagues believe that by using this framework, researchers can simultaneously explore such issues as knowledge about college going, the benefit of social networks in college access, perceptions of college affordability, and an understanding of how to navigate college. There is some evidence that this is useful for understanding the transition experiences of students of color. For example, Nuñez (2009) connected sense of belonging to social capital theories. Specifically, Nuñez identified sense of belonging on campus in the early of years of college as a form of social capital, drawing linkages to Stanton-Salazar's (2004) conceptualization of social capital as having elements of the degree to which students receive moral and emotional support in educational contexts.

ACF can seamlessly be applied to research on the college student transition process, college readiness and preparation, college choice and enrollment, student success and retention, graduation and career choice, and giving back to communities or family uplift (St. John, 2012). This work underscores the importance of providing students with opportunities to develop social networks (e.g., mentors, faculty, staff, peer networks) and cultural knowledge (e.g., norms of behavior) that are relevant to the college campus as a way to help students successfully transition to campus. Some of the impetus for ACF was initiated in St. John's (2003) earlier work, the balanced access model. The balanced access model, rooted in Rawls' theory of social justice, examined gaps in college-going opportunities. Of specific interest to St. John was the government's role in promoting postsecondary opportunity (St. John). St. John asserted that equal opportunity for all (i.e., low-income and other underrepresented students) should take priority over equity of opportunity (i.e., reducing the average cost for the majority).

In order to achieve balanced access, four issues were necessary to consider: (1) family background's and income's influence on student expectations and plans, (2) students' expectations and plans' influence on academic planning and courses taken in high school, (3) college preparatory curriculum in high school that likely influences students' scores on college entrance exams and ability to complete applications for college, and (4) planning for college such as college preparatory curriculum and applying for college (St. John, 2003, p. 153). The balanced access model revealed connections between financial background and academic preparation, maintaining that both of these factors influence college access, transitions, and persistence through

degree programs. Academic capital formation was used to continue to examine these issues, underscoring students' individual agency and the way that college participation could affect the intergenerational uplift of families or entire groups (e.g., low-income or first-generation students, students of color) (St. John et al., 2011).

Human, social, and cultural capital theories, overlapped through ACF, offer some answers to the question of how social status, privilege, and opportunity are passed from one generation to the next. ACF, in line with Bourdieu's social reproduction theory (1979/1984; Bourdieu & Passeron, 1964/1979), focused on the more implicit aspects of social status (i.e., the factors besides economic capital). Human capital emphasizes acquired knowledge or skills (primarily acquired through formal education) from a cost-benefit approach (i.e., the cost of achieving higher education versus the benefits) (Becker, 1964). Social capital highlights the way that social networks (i.e., relationships) can be used to acquire social status (Bourdieu, 1984; Bourdieu & Passeron, 1979). Cultural capital, acquired through formal education and/or from one's family or social origin, is associated with skills, knowledge, competences, or abilities that are rewarded in a particular social setting (or "field") that gives cultural capital its value (Bourdieu, 1984; Bourdieu & Passeron, 1979; Winkle-Wagner, 2010). Within the theory of social reproduction, Bourdieu (1979/1984) also initiated the concept of "habitus" or a set of normed dispositions or expectations that lead to the actions that makes ideas such as going to college viable. In a departure from previous work on habitus in exploration of social capital, St. John et al. (2011) refer to habitus as "habitual patterns." Finally, although perhaps not fully tested in an empirical way is the assumption that one has the opportunity to either reproduce existing social stratification or to transform this social stratification and experience upward social mobility (Winkle-Wagner, 2010, 2012). This notion of social transformation is particularly highlighted within academic capital formation: By successfully transitioning into college and completing a degree, a student could potentially transform his or her familial and/or racial social status, leading to the uplift of an entire group.

Applied to the study of college student transitions, this blending of the capital theories could help to explain the *process* of how some students might have a smoother transition than others. The theoretical assumption inherent in ACF is that transitioning into college may hold the key to social uplift for entire groups of people. Through building social networks (social capital) and developing particular social or cultural competencies (cultural capital), a student might be able to transfer this "capital" to the advancement of her/his family and group. The practical implication of ACF is that support programs aimed at aiding students' transitions into college must include financial, academic, and emotional/social support.

Theory of Validation

Rendón's (1994) theory of validation, initially developed in her research on nontraditional students, suggested that faculty and staff within institutions of higher education should validate students' prior knowledge and beliefs in order to foster the successful

college transition and ultimate success of underrepresented (e.g., nontraditional, low-income, community college transfer students, students of color) students. The assumption of this line of thinking is that diversity is beneficial to all campus actors and that one way to embrace this diversity is to actively engage in deliberate validation of it. By validation, Rendón refers to a *process* of “enabling” and “confirming” students in order to facilitate students’ academic and interpersonal development (p. 44). This approach was in direct contrast to the more typical “no pain, no gain” tactic that is often employed in college and universities where students are essentially told that they should suffer through and ignore their own differences on campus (Rendón, 1994, 2002, p. 644). Rendón’s (1994) concept of validation means that students are to be recognized and supported for who they are and for the diversity they bring to campus.

Validation theory extends the research on female, first-generation, and racially underrepresented students that argues that encouragement and support significantly impact students’ development in college (Belenky, Clinchy, Goldberger, & Tarule, 1986; Terenzini et al., 1994). This line of thinking was initiated in part as a critique of theories of student involvement (e.g., Astin, 1985) that assert that students who are highly involved in and out of the classroom will be more likely to integrate into campus life and ultimately will do well academically.

There are six elements to validation that Rendón (1994, 2002) maintains are critical for supporting students and particularly those students who are underrepresented on college campuses:

1. The responsibility for initiating contact with students must be on institutional agents (faculty, staff, and administrators).
2. When validation is present, students will be better able to learn and will also develop a better sense of self-worth.
3. Validation is a prerequisite to student learning. Students are more likely to become involved and integrated into campus if they are validated for who they are.
4. Validation can occur in and out of the classroom.
5. Validation is a developmental process and is ongoing rather than being an outcome.
6. Validation is an indispensable part of students’ early college experience, particularly in their first year and first weeks on campus.

There are two kinds of validation, academic validation and interpersonal validation, both of which must happen both inside and outside of the classroom (Rendón, 1994). For academic validation to occur, campus actors such as faculty, staff, or administrators must help students to trust their “innate capacity to learn” in order for students to gain confidence in their abilities in college (p. 40). Interpersonal validation transpires when campus agents nurture students’ personal development and social adjustment.

The theory of validation has been used to explore racially underrepresented students’ community college transfer (Rendón, 2002), college student transitions (Terenzini et al., 1994), and persistence in degree programs (Holmes, Ebberts, Robinson, & Mugenda, 2001). Rendón applied the validation theory to Latina/o students through the study of a first-year experience initiative that aimed at helping

students transfer from 2- to 4-year colleges in California, Rendón (2002) found that a “validating team” composed of an English faculty member, a counselor, and a mentor provided information and planning help to students on how to transfer to a 4-year institution, academic preparation, and encouragement regarding the benefit of getting a college degree. All of these were important aspects of supporting students in the community college transfer process. The team provided information and assistance to students regarding how to transfer to a 4-year institutions, academic preparation, and encouragement for their degree goals. Similarly, examining the college transition process of students of color within various institutional types (community college, liberal arts college, and universities) through focus groups, Terenzini and his colleagues (1994) found that early validation from faculty and peers in particular is crucial to students’ successful transition onto college campuses.

Rendón’s validation model was crafted with a particular focus on those students who may perceive college as being disparate from their families’ experience, cultural backgrounds, communities, or previous educational experiences. This framework has been used to understand the college transitions and experiences of various racial/ethnic student groups such as first-generation students (Lundberg, Schreiner, Hovaguimian, & Miller, 2007) Latina/o students (Chaves, 2006; Rendón, 2002) and African American students (Holmes et al., 2001). While the theory of validation has been used in studies that relate well to the college transitions of students of color because of the aim toward affirming students’ racial/ethnic/gender/class identities, more empirical work that uses this framework is needed, particularly within 4-year institutions. Additionally, while there is some evidence that validation of students’ identities early in their transition process (Terenzini et al., 1994) is helpful, more research is needed on ways that validation might foster successful transitions for underrepresented students, particularly since the theory of validation was crafted specifically for consideration of non-traditional and underrepresented college students

Academic Experiences and the Transition to College

The traditional theories on college student transition suggest that students’ prior familial, community, and school (i.e., primary and secondary) experiences influence transitions to college. Thus, we begin with a focus on educational experiences that occur before a student steps foot onto campus. We particularly focus on the way that these primary and secondary experiences can lead to disparities in academic preparation. Then, based on these primary and secondary educational experiences, we explore the gaps in academic preparation that students of color disproportionately face as compared to their White peers. These gaps in preparation often lead students to need developmental or remedial coursework to help them be prepared for college coursework. Next, we examine early academic experiences, focusing on psychological and sociological perspectives relative to these. Finally, we investigate first-year experience programs that are geared toward fostering academic success for students of color as they transition into college.

Precollege Academic Preparation

Preparation for the college transition process begins long before a student enrolls in his or her first class. While recent work in higher education has emphasized the importance of preparing academically for college during the high school years (see Tierney, Corwin, & Colyar, 2004), a student's chances of attending college are influenced by academic preparation that begins as early as elementary school. In analyzing the research on precollege academic preparation, we focused in particular on the role of two issues that influence college transitions for students of color, primarily rooted in a sociological disciplinary perspective: parental involvement and within-school inequality. The bulk of this research emphasizes K-12 educational experiences. We assert the importance of examining these factors because the influence of family and prior schooling could greatly affect students' chances of being academically successful in their college transition process and there is also an emphasis in popular media on parents of color with regard to educational aspirations and college going.

Family Influences

The school and the family go hand-in-hand relative to preparation for college, and family influences precollege academic preparation at an early level of education (Lareau, 1987). For instance, in Lareau's participant observation of parental involvement in elementary classrooms, she found that even as young as first grade, students' expectations for the college transition process were being initiated with middle-class parents being involved in ways that began to prepare students to expect to attend college.

Research in sociology maintains that even the way that parents spend recreational time out of school with their children may influence a students' success in education and eventual preparation for college (Lareau, 2003). In an ethnographic study of Black and White middle- and working-class families, Lareau found that students from families who practiced what she called "concerted cultivation," in which students were involved in more structured, formal out-of-school activities, were more rewarded in schools. Cheadle's (2008) extension of this work found that White families were more likely to use a "concerted cultivation" style of parenting and that this apparently did help increase reading and math scores in elementary school. While these studies are at earlier levels of education, the groundwork for a students' seamless transition to college is laid even in these early stages.

Within-School Inequalities in Precollege Academic Preparation

The college-related academic preparation that occurs in primary and secondary schooling is intimately linked to the curriculum and courses into which students are placed. The study of within-school inequality captures the notion that students may

experience differential academic preparation within one school building. One of the major ways that within-school inequalities are studied is through a debate as to whether students should be grouped into differential curricula or classes based on their academic ability. Scholars debate whether students should be placed into homogenous ability groups with students who are of similar academic ability in a particular subject or into heterogeneous groups with students of varying ability.

Scholarship on tracking, or grouping students by similar academic ability, was a growing line of research in the 1980s and 1990s and suggested that tracking is particularly detrimental to African American and Latina/o students' educational chances and attainment. These initial tracks often determine what students learn and subsequent classes that students are prepared to take in high school and ultimately whether students will be academically prepared for college (Oakes, Wells, Jones, & Datnow, 1997). In the past 15 years, the bulk of the research on ability grouping has been primarily focused on detracking efforts or instances where schools attempt to provide more flexibility, choice, or movement between tracks or academic groupings in schools (see, e.g., Oakes et al., 1997; Rubin, 2003; Yonezawa et al., 2002). The evidence of this work asserts that while detracking efforts have largely been attempts to move away from racial inequalities in tracking practices, there is an ongoing debate as to whether the goal of making ability grouping more racially equitable has been achieved (O'Connor et al., 2011; Rubin, 2003; Yonezawa et al., 2002).

On the one hand, there is evidence that particularly high-achieving students do better academically in homogenous groupings in which students are placed with students who have similar academic abilities (Hallinan, 1994a, 1994b; Robinson, 2008). In a path-breaking longitudinal study of more than 4,000 students in two cohorts, Hallinan (1994a) found that students in higher tracks experienced an increased rate of learning and that, in some cases, the tracks correlated to students' social origins such as class or race. There is also more recent evidence that homogeneous grouping may have positive outcomes for some underrepresented populations, such as for the reading achievement of children who speak English as a second language (Robinson, 2008). Corroborating this idea that homogenous grouping may facilitate higher achievement, at least for students in the higher tracks, in a study of detracking efforts in a Chicago high school where all students were grouped into the same math classes, students did not necessarily do better in math (Allensworth, Nomi, Montgomery, & Lee, 2009). Some high schools that practice ability grouping foster a "winner-take-all" approach in which the majority of school resources are focused on a few high-achieving students at the expense the rest of the students (Attewell, 2001).

On the other hand is an argument that students do better and are treated more equitably when placed into heterogeneous academic ability groups (Burris, Heubert, & Levin, 2006; Oakes, 1994; Welner & Oakes, 1996). While heterogeneous ability groups are seemingly based on a students' academic ability in math or reading, the groups often correlate with race and gender categories (Gorman, 1998; Oakes, 1995). That is, students of color and students from low-income backgrounds are much more likely to be in the lower tracks in math and reading, creating within-school

segregation that has the potential to significantly shape students' early educational experiences (Oakes, 1995). The evidence on this side of the debate maintains that ability grouping can be pedagogically harmful, particularly for students from underrepresented groups such as students of color (Welner & Oakes). For instance, in a longitudinal study of heterogeneous grouping in advanced middle-school math classes, Burris and her colleagues found that these mixed ability classes increased rates of participation in advanced math classes for all students but particularly for racial minority students.

Many of the ability grouping, tracking, or detracking studies are longitudinal, following large cohorts of students over a period of time. The benefit of this approach is that it does allow for some of the outcomes of ability grouping to emerge. However, the subjective experiences of students who are being grouped are generally understudied. Some of the research that does attempt to offer insight into ways that students might experience ability grouping employs ethnographic methods such as participant observation in schools or other extended case study methodologies. This is likely because capturing the practice of ability grouping within schools requires a detailed, prolonged period of time in the field. The debate continues as to whether ability grouping aids or hinders the precollege academic preparation process for students of color more generally. What is clearer is that, even within the walls of one school building, students do not experience the same kind of academic preparation for the college transition process.

One of the major issues in the work on precollege academic preparation is that it is rarely linked explicitly to the college transition process. The research largely remains in silos where some scholars study K-12 education and others higher education. Future work should attempt to make the links between the various levels of education clearer.

Remediation and Developmental Classes

Depending on the experiences of students of color in elementary and secondary education, they are either academically prepared for college coursework or they may have to take additional classes, typically called developmental education (also referred to as remediation or remedial courses) classes, to gain this academic preparation. Typically, these remediation classes focus on reading, writing, or mathematics skills necessary for a student to be able to academically compete in college. In the past, most institutions, both 4- and 2-year institutions, had some kind of remedial coursework (Roueche & Roueche, 1999). Underrepresented students such as students of color, first-generation, and low-income students are greatly overrepresented in remedial/developmental classes (Attewell, Lavin, Domina, & Levey, 2005). Some scholars assert that without these developmental/remedial classes, these underrepresented students would never make the transition to college because of their lack of preparation in particular courses (Lavin & Weininger, 1998).

Remediation coursework has come under fire within many institutions in the past 15 years. Opponents claim that the need for this kind of coursework indicates that these students should not be admitted into college (Kozeracki, 2002; Marcus, 2000; Soliday, 2002; Trombley, 1998). An additional concern about remedial coursework is that it typically does not count toward a degree program, so for some students, it can make persistence in college that much more difficult (Deil-Amen & Rosenbaum, 2002; Rosenbaum, 2001). Thus, many of the remedial classes have shifted toward only being offered in 2-year community colleges (Bettinger & Long, 2004; Kozeracki, 2002; Soliday, 2002).

The evidence on the outcomes of remediation in terms of students' adjustment to college is mixed. On the one hand, some scholars assert that students who are offered the opportunity to take remedial coursework may be more likely to successfully finish their degree programs (McCabe, 2000; Merisotis & Phipps, 2000). Lavin and Weininger (1998) provide some context for this argument in their study of City University of New York students, finding that more students of color initially failed academic skills tests than White students and that those who enrolled in remedial coursework often did complete their degrees. Without this remedial coursework, though, the students would not have been able to complete degrees. This finding is supported by recent quantitative work studying the effects of math and English remediation on over 28,000 students in Ohio. The results suggested that students who took remedial coursework were more likely to persist in college and to complete a bachelor's degree (Bettinger & Long, 2009).

Adelman's (1999, 2004) analysis of the High School and Beyond dataset indicated just the opposite: that students who took remedial coursework were less likely to graduate if they took a high number of remedial courses. In a study comparing two community colleges where students often did not know that remedial coursework did not count toward their degree programs, Deil-Amen and Rosenbaum (2002) supported Adelman's findings.

There is a large gap in the research related to remediation or developmental education. Most of the scholarship that does exist focuses on the historical and political contexts of remediation. Other work focuses on the demographic inequalities that emerge from exploring those who are in these courses (i.e., the overrepresentation of students from minority groups in these courses). There is a need for more research contemplating the way that remedial coursework either helps or hinders students' transition into degree programs in college.

There have been some advances in remediation work related to academic enrichment programs and interventions. Evidence suggests that academic enrichment programs, perhaps in place of traditional remediation coursework, might be helpful in fostering positive transitions into college, particularly for underrepresented students (Colyar & Stich, 2011; Conley, 2008). These academic enrichment programs foster remediation for academic preparation that might have been lacking in secondary education while also paying close attention to the development of students' identities (Colyar & Stich, 2011). Some of the research on academic enrichment programs designed specifically to aid in the successful academic transitions of students of color in biology indicates that participants had greater

odds of persisting through basic math and science courses (Barlow & Villarejo, 2004; Villarejo, Barlow, Kogan, Veazey, & Sweeney, 2008). More research is needed to see how this influences the academic transitions, and remediation experiences, of students of color.

Early Academic Experiences in College

Studies of students' academic experiences primarily use two approaches: (1) social or sociological approaches that connect college academic experiences with larger social issues such as a student's background or the effect of peers and (2) psychological approaches that explore students' motivation, academic self-efficacy, or metacognition (i.e., thinking about how one thinks) in their college transition process.

Sociological Approaches to Early Academic Experiences

Precollege academic experiences such as tracking play a role in determining how prepared students are when they begin the transition into college. There is a significant body of research suggesting that students of color, particularly first-generation students, often find themselves in positions of being less prepared academically for college, making the transition into college more difficult (Pascarella, Pierson, Wolniak, & Terenzini, 2004; Rendón, Hope, & Associates, 1996; Terenzini et al., 1994). First-generation students, for instance, have been shown to have less rigorous coursework in high school to prepare them for college (e.g., Advanced Placement courses) (Reid & Moore, 2008; Warburton, Bugarin & Nuñez, 2001). Also, based on the location of the school in urban or rural areas, the learning environment may differ dramatically from the college environment. For instance, a study of life histories of urban students who were transitioning to college suggested that the students struggled academically in college because of the very different learning environment of the college classroom (e.g., fewer students of color, more technology in the classroom, different teaching styles) as compared to the urban high schools from where they came (Reid & Moore, 2008).

Community colleges are credited with serving many of the students from underserved populations, such as students of color (Levin, 2001; Shaw & London, 2001). However, the community college students' experience in academics is vastly different than their 4-year counterparts. These differences are in part due to differences in student-faculty contact (Galbraith & Shedd, 1990; Jaeger & Eagan, 2009; Umbach, 2007). Galbraith and Shedd (1990) found that pedagogical practices and professional development of adjunct instructors are crucial in supporting adult learning in community college settings. These become important matters to consider as Jaeger and Egan, in a study of California community colleges using hierarchical generalized linear modeling (HGLM), found there was an association between increased

contact with part-time faculty and a decreased likelihood that students would complete an associate's degree. This corresponds with previous evidence that part-time faculty spend less time with students, have fewer interactions with students, and bring less scholarly authority into the interactions that they do have with students (Umbach).

One way that academic preparation gaps can be bridged is through cocurricular programming, aimed at bridging students' academic and social experiences on campus. For example, in a survey study about living-learning programs, results indicated that first-generation students who were involved in living-learning programs within campus residence halls reported a more successful academic transition to college than their peers who were in residence halls without living-learning communities (Inkelas, Daver, Vogt & Leonard, 2007). This study suggests that structured activities that promote student-faculty interactions and programming that deliberately aids in academic transitions might be useful for students from under-represented students (Inkelas, et al., Inkelas & Weisman, 2003).

In the realm of sociological notions of the study of peers' influence on the academic adjustment of students of color, the "acting White" phenomenon is arguably one of the most important lines of research. While the notion of "acting White" was initially studied in primary and secondary schooling, this perspective could greatly influence the way that peers are viewed for students of color in higher education by the general public. Fordham and Ogbu (1986) and Ogbu (1987) first developed the concept of "acting White" through Fordham's ethnographic study with African American adolescent boys in a metropolitan high school. In this landmark study, Fordham and Ogbu suggested that "acting White" occurred as African American males responded, through a counterculture or oppositional culture, to a school culture that excluded them. Fordham's (1995) subsequent analysis interrogated the "acting White" concept among African American adolescents, claiming that positive images of successful African Americans are "blackened out" in American society and in education and, therefore, some students respond by disengaging in academics. Subsequently, the concept of "acting White" was often condemned as being linked to a deficiency approach that described an anti-intellectual peer culture in which the adolescent African American males were particularly seen as associating "acting White" with doing well academically. But Fordham maintains that this is a misinterpretation of her concept and that the reason students disengage academically is because the educational system is not inclusive of their needs (Fordham, 2008), a claim supported by other scholars (Carter, 2006; Fordham, 1995; Horvat & O'Connor, 2006; Tyson, Darity, & Castellino, 2005).

There is a second branch of scholarship suggesting that interpreting "acting White" as an anti-intellectual peer culture may miss important nuances among racially underrepresented students' friendship groups (Carter, 2005, 2006; Ogbu & Davis, 2003; Tyson, 2002). Examining the "acting White" phenomenon among African American and Latina/o students in K-12 schooling, Carter's (2005) research found that students of color do value education as a key component of economic mobility and that the "acting White" issue is really a rejection of the "White" American norms of interaction, speech, dress, and musical tastes (also see Carter,

2006). Ogbu's later work also suggested that particular groups of Black students might actually attach positive meaning to academic engagement, even achieving academically over gaining popularity among peers (Ogbu & Davis, 2003). Tyson's (2002) quantitative analysis also suggested that African American students did not experience ridicule for learning and even excelling.

Applied to the college transition process, the underlying deficiency approach in much of the "acting White" scholarship assumes that negative peer culture could dramatically influence racially underrepresented students' ability to successfully prepare academically for college or to transition to college if they do enroll. However, work by Carter (2006) and Tyson et al. (2005) explores the structural contexts of low-income African American and Latina/o youth and identifies influences that shape their educational trajectories beyond peer interactions. In scholarship about the transitions of students of color, the notion of "acting White" peer culture has been applied to issues such as the exclusivity of "academic discourse" (White & Lowenthal, 2011), minority-status stressors (Smedley, Myers, & Harrell, 1993), and as an explanation for the Black-White achievement gap (Horvat & Lewis, 2003). In White and Lowenthal's (2011) theoretical analysis of language use and college students' transitions, they maintained that academic discourse may be linked to "acting White," disallowing students of color from fully transitioning into the college campus. However, the "acting White" concept has also been interrogated, either explicitly or implicitly, in research on high-achieving Black students (Fries-Britt, 1998; Fries-Britt & Griffin, 2007; Harper, 2006). In their qualitative analysis of high-achieving Black students' experiences, for example, Fries-Britt and Griffin found that students actively worked to resist stereotypes while maintaining their academic engagement. There is also some evidence that women of color may assert that friendship was necessary to their academic development, according to Matinez Alemàn's (2001) longitudinal cohort study.

Psychological Approaches to Early Academic Experiences

The psychological research related to students' academic transitions into college emphasizes issues such as students' motivation, academic self-efficacy, and metacognition (thinking about thinking). The psychological concept of self-efficacy, rooted in Bandura's (1977, 1982, 1986) social cognitive theory and studies, looks at an individual's self-evaluation of her/his competence or ability to successfully complete a particular course of action in order to reach desired result. This self-evaluation becomes a set of beliefs one has about one's own ability. Essentially, academic self-efficacy refers to the way in which a student's beliefs about his or her ability to complete academic tasks influences academic performance (Bandura, 1993). Bandura asserted that a student's self-efficacy beliefs influence students' motivation and subsequent persistence at mastering challenging academic tasks and by fostering the efficient use of acquired knowledge and skills. Students' academic self-efficacy beliefs influence their motivation (Bandura, 1991; Martin, 2009), where students who had high academic self-efficacy might attribute failure to insufficient

effort and those with lower self-efficacy might attribute failure to low ability (Bandura, 1993). Motivation also connects to a student's perceived ability to control her or his academic environment or self-regulatory behavior, particularly related to the motivational, affective (emotional), and social (peer) aspects of that environment (Zimmerman, 1990; also Pajares, 1996). Applying this to minority students in particular, there is evidence that students who perceived a great ability to control or self-regulate their academic environment (motivation, emotional, and social aspects) were more likely to have high self-efficacy or a sense that they could master academic skills (Zimmerman, Bandura, & Martinez-Pons, 1992).

Scholars applying Bandura's work to college students have found that high academic self-efficacy positively associates with academic performance in college (Bong, 2001; Brown, Lent, & Larkin, 1989; Hackett, Betz, Casas, & Rocha-Singh, 1992; Lent, Brown, & Larkin, 1984; Multon, Brown, & Lent, 1991). One reason for the connection between academic self-efficacy and academic performance might be that college students with a higher academic self-efficacy may spend more hours studying, as the results of Torres and Solberg's (2001) study suggest. Additionally, students with high academic self-efficacy may be more resilient to academic obstacles, according to the findings of a narrative study of college women in math or science (Zeldin & Pajares, 2000).

Some research indicates that academic self-efficacy correlates with decisions to persist in college (Lent, Brown, & Larkin, 1986, 1987; Lent et al., 1984, 1986, 1987). For instance, in a longitudinal study of first-year college students' adjustment processes, academic self-efficacy and optimism were strongly related to academic performance, adjustment to the campus, and commitment to remain in college (Chemers, Hu, & Garcia, 2001; also Torres & Solberg, 2001). Applying this to minority students in particular, through the development of a survey instrument to examine the role of self-efficacy and stress on academic performance of students of color (including immigrant students), Zajacova, Lynch and Espenshade (2005) found through structural equation models that academic self-efficacy was a predictor of academic performance in college.

In summary, academic self-efficacy has been used as a predictor of how well a student adjusts to college, and this has been applied to students of color (Solberg, O'Brien, Villareal, Kennel, & Davis, 1993; Torres & Solberg, 2001). In a study comparing first-generation students with those whose parents are college-educated, Ramos-Sanchez and Nichols (2007) found that those students who reported a high academic self-efficacy also reported a better college adjustment.

Several instruments have been primarily used in studies about college student self-efficacy as it relates to adjustment process. The College Academic Self-Efficacy Scale (CASES) focuses on a series of routine or frequent academic tasks for college students (Owen & Froman, 1988). Studies using the CASES instrument indicate that academic self-efficacy does help to predict college students' academic outcomes or grades (Choi, 2005). Another instrument, the College Self-Efficacy Inventory (Barry & Finney, 2009), has been applied to the college adjustment of students of color such as Latina/o students, suggesting that academic self-efficacy is associated with how well a student adjusts to college (Solberg et al., 1993; Torres &

Solberg, 2001). Yet validity studies indicate that the instrument needs further refinement (Barry & Finney, 2009).

Linked to self-efficacy, there is a growing body of research that emphasizes metacognition as it relates to college students' adjustment (Chemers et al., 2001; White & Lowenthal, 2011). Empirical work is limited relative to ways that metacognition relates to the college transition process. However, there is some indication that student success programs have applied the findings of metacognition studies as a way to help students learn in college (Myers, 2003). Future empirical work should focus on how the way students of color in particular think about their own cognition or thinking processes might influence their self-efficacy and ultimately, their academic adjustment to college.

One of the potential barriers to positive academic experiences for many students of color is their finances. Financial concerns can be a distraction from fully engaging in academics and can greatly influence the transition to college. Researchers have found that students' family income continues to affect undergraduate GPAs in the first year (Kuh, Kinzie, Cruce, Shoup, & Gonyea, 2006a, 2006b). Our next section turns to various dimensions of student finances.

Finances and the Transition to College

There are many economic and financial aid issues for students of color that affect their college access, how they transition to college, and academic outcomes in the early years of college. This section is organized into four sections: unique challenges faced by students of color, types of financial aid and their effects on the early years of college, financial aid policies, and theoretical and empirical considerations for how students of color finance their postsecondary opportunities.

Discussed earlier in this chapter, a theoretical foundation of transition to college research is Tinto's Theory of Student Departure. Tinto (1975) initially conceived of investigations into the relationships between the transition to college and finances, including aid packages, employment, and familial support and resources as irrelevant. Tinto believed that what mattered in students' departure decisions was how well they were integrated into the academic and social communities on campus and that finances were often used as an excuse. Since that time, Tinto (1993) has revised his model of college student departure to include how finances may affect students' transition to college (and their academic and social integration) into college communities. Moreover, a number of scholars have examined the role of financial aid in students' year-to-year persistence and retention through graduation (e.g., St. John, 1991; St. John & Noell, 1989). A lack of aid can diminish access to 4-year state institutions for Latina/o and African American students, including those with high standardized-test scores (Hilmer, 1998). The same holds true for community college students. Hawley and Harris (2005) examination of CIRP YFCY data at a community college revealed that students' lack of options regarding paying for college leads to a greater likelihood for students leaving before completing their first year of college.

Financial Stress

In 2009, 77% of first-year students responding to Your First Year in College Survey reported some level of concern about paying for college and only half were satisfied with their financial aid packages (Ruiz et al., 2010). Sanchez et al. (2010) found that Latina/o students' decision-making about college is affected by the stressful financial realities they face, and this stress follows them to the first year of college. Worries about paying for college have negative effects on adjustment to college, both socially and academically for students of color as well as their White counterparts, with students of color having heightened concerns (Hurtado et al., 2007).

A consequence for students experiencing significant financial stress is that it may affect their interactions on campus. Hurtado et al. (2008) found that African Americans interested in STEM with greater concerns about paying for college were less likely to engage in undergraduate research activity in the first year of college. Previous research has established the importance of out-of-classroom activities for promoting STEM majors among students of color (Locks & Gregerman, 2008). One key area where institutions may help promote transitions to college would be in placing more emphasis on providing prospective students adequate aid packages, particularly in the first year of college.

Low-income Students of Color

Coming from a low-income background can pose particular challenges for students in terms of affording to stay in college. Low-income individuals, to a much greater extent than middle-class individuals, also experience financial stress around paying for college, being involved in college, and affording to stay in college. In 2003, nearly half of all undergraduate students came from low-income backgrounds defined by those who earned \$37,000 or less for a family of four (Cook & King, 2005). Of these low-income students, 48% were students of color (ACE). Income level has a strong relationship to the type of institutions students attend: Among students of color, African American, Latina/o, and Native American students were enrolled at community colleges at rates 8–10% higher than their White counterparts.

According to NCES, a little over one-third of first-generation college students enrolled in the 12th grade in 1992 were students of color and were more likely to be African American or Latina/o (Chen, 2005). Students who are the first in their families to attend college have hidden costs associated with attending college yet; costs do not always directly drive first-generation college students' decision about where to attend school. In addition to institutional enrollment disparities posed by income levels, low-income students have constrained opportunities to become engaged on campus during the first year of college for a variety of reasons. Such students work while in college and are more likely to live at home. Bozick (2007) utilized NCES

BPS 1996 data and found that income drives who lives on campus and who lives with their parents. Further, students from the lowest-income backgrounds live with their parents the first year in college, across all sectors of higher education—public/private, for-profit/not-for-profit, and 2-year/4-year (Bozick).

The consistency of this finding illuminates how constrained personal and familial financial resources restrict such students' ability to pursue choices that support the successful transition to college such as living in on-campus housing where students have constant access to peers, information, and staff employed to assist them. Bozick's work untangles the complex interplay of wealth and income; controlling for income, students with more wealth were 6% more likely to persist to the second year of college. This finding and study are important for two reasons: First, the findings point to an overarching weakness in many empirical studies in higher education—the use of income as an indicator of SES. Second, Bozick's work provides a thorough and complex measure of wealth measured by “net worth of the student's parents, including the sum of their cash, savings, and checking and the net values of farm, business, and other investments” (p. 267). Both are potential contributions to higher education's understanding of why some middle-income students of color continue to struggle.

Financial Aid

As students make the adjustment to college, the freedom to become involved in campus life may be hindered by inadequate financial aid (Cabrera et al., 1992; St. John, 1991; St. John & Noell, 1989). Evidence indicates that having levels of unmet financial need that is greater than 10% of the cost to attend their college decreases the likelihood that students will return for the second year (Bozick, 2007). Crisp and Nora (2010) using the BPS:04/06 dataset found that among Latina/o community college students, those who received more aid were more likely to persist to the second year of college. Reyes (2000) qualitative study of Alaskan Native students described financial challenges as a barrier to persistence, one that could be ameliorated by adequate financial support. The findings of these studies call attention to the importance of providing adequate aid at the beginning of college to promote both academic success and persistence to the second year of college among college students of color. Hu's (2010) examination of Gates Millennium Scholars (low-income and high-achieving students of color) links financial aid and student engagement (based on NSSE constructs) concluding that comprehensive aid packages such as those offered by the GMS program work indirectly to positively impact students early social and academic engagement in college.

Other studies on the influence of financial aid for students of color have described similar positive effects between the amount of aid and persistence. Nyrienda and Gong (2009–2010) found that across three cohorts of incoming first-year students 2003–2005, at a mid-Atlantic HBCU, the more aid students received, the greater their persistence rates to the sophomore year. Further, paying

in-state tuition was a positive predictor of persistence. Nyrienda and Gong's examination is illuminating because these results were not consistent once cohort-specific analyses were conducted. For example, for the 2004 cohort, in-state tuition positively affected year-to-year persistence, whereas in the 2005 cohort, the amount of financial aid was a positive predictor of the same outcome. These nuances highlight the importance of institution-specific studies and the benefits to conducting analyses over time to unearth any particular dynamics at work from one incoming class of students to the next.

Aid Type

Not specific to students of color, Kuh and his colleagues (2006a, 2006b) found that receiving a merit-based grant had a positive influence on first-year GPA and students' propensity to return to their campus in the second year. These findings hold even when regression models included variables such as student engagement and student enrollment (full or part-time), commuter, and transfer status. Minority students have also been found to be more sensitive to the type of aid, with grants having a positive relationship with enrollment and persistence (Hu & St. John, 2001; St. John & Noell). Alon (2007) sheds light on the nuances of aid packages and their effect on graduation rates, finding that aid in the form of scholarships and grants and the amount of aid had strong effects on students of color graduation rates compared to their White counterparts. In keeping with previous findings, first-generation college students are more sensitive to grant aid and also the amount of work-study funding included in their aid package (Lohfink & Paulsen, 2005). For African American students whose parents make \$50,000 a year or less, receiving merit-based grants as part of the financial aid packages had a positive effect on their returning to their campus for the second year of college, indicating a successful transition to college.

Using Nora, Barlow and Crisp's (2006) theoretical framework, Oseguera, Denson and Hurtado (2008) found that for Gates Millennium Scholars (GMS), the less their financial burdens, the more opportunities they have to become intellectually and academically engaged in meaningful ways. These findings foreshadowed those by DesJardins, McCall, Ott and Kim (2010) that demonstrated GMS funding reduced students' employment hours and increased their campus involvement in activities known to support the transition to college volunteering (Marks & Robb, 2004) and culturally based activities (DesJardins et al., 2010; Hurtado & Carter, 1997; Rendón, 1994).

Many studies that focus on community college students' aid and outcomes are institutional studies or studies that focus on a single state. Mendoza, Mendez and Malcolm (2009) found that a state-based aid source, Pell Grants, and federal loans positively affected community college students' transition to college, measured by persistence from the first to the second year of college. However, the authors note that these positive effects were lessened for groups of students of color and low-income students. While more recent studies have begun to use advanced quantitative

methods, such as hierarchical linear modeling (e.g., Jaeger & Eagan, 2009), few national studies exist. Moreover, quantitative research on persistence, GPA, and other variables does not fully capture the complexity of students' lives—particularly students of color who enroll at community colleges as adult learners.

Financial Literacy

MacCallum (2008) examined whether the financial aid policies and procedures among California's community colleges and how such policies affected student access and retention. MacCallum (2008) found early disbursement of Pell funds, use of a large commercial computer system and staff training, and resources all had a negative effect on student retention. Moreover, financial aid staff workload, measured by the volume of aid applications processed, such as fee waivers and Pell Grants, was negatively associated with students' success, measured by number of courses with C or better or credit earned (MacCallum, 2008). Allen (2007) raised questions about the efficacy and ethics of programs such as 2futuro, a nonfederal-based aid program framed as "a college financing program designed for Latina/o students and their families" that offered an applicant portal to the previously offered "Federal Family Education Loan Program." Although some research indicates that workshops and programs designed to increase students' knowledge of financial aid does increase their college-going rates (Bell, Rowan-Kenyon, & Perna, 2009; Murr, 2010), the depth and breadth of availability of such programs remains limited. This puts all students of color at risk during the transition to college, and Native American students are particularly vulnerable to this lack of information about financial aid (Tierney, Saltee, & Venegas, 2007). Shim, Barber, Card, Xiao and Serido (2010) built and tested a model to examine sources of students' financial socialization. Parents by far had the greatest influence on how students learn to make sense of their financial lives. This nuance is important to understand, particularly for those students of color who are the first in their families to go to college, whose parents may not have adequate social financial capital to help their children navigate the financial realities of attending college. Moreover, the current economic climate presents new challenges to all college students but particularly students of color whose social capital may not lend itself to the financial literacy needed for successful transition to college. Much more research is needed to explain the findings of studies such as those by Gilligan (2012), who found that Latina/o and Asian American college students in California were less financially literate than their White counterparts, controlling for SES, institutional type, and financial stress. These findings echo those of McDonough and Calderone's (2006) qualitative exploration of school counselors' financial aid practices. School counselors in this grounded theory study found that counselors reported that African American and Latina/o parents were not consistently clear about distinctions between types of aid (e.g., loans, and grants) (McDonough & Calderone). Given the previously outlined research on the negative effect financial stress has on students of color in their first year of college, more nuanced research using advanced statistical methods such as those employed by Shim et al. (2010) is needed.

Loans

In 2007–2008, 53.3% of all students who received federal financial aid had loans. For students of color, only African Americans took out loans at a higher rate than the general student populations—at an alarming rate of 70% (Wei et al. 2009). All other students of color were at or near the 50% mark with the exception of Asian American students (37%) (Wei et al.). Despite these patterns of aid across communities of color, the literature on loans for students of color does not give a clear or consistent picture of the effects of loans as part of the college-choice process or how loans affect the transition to college for African American and Latina/o students, and even less is known about Asian American students and Native American students relative to loans as part of financial aid packages. England-Siegerdt (2011) found that Native American, Asian American, and Latina/o students are less likely to borrow to support college-going costs, highlighting the need to disaggregate data in analyzing how students of color use aid and the need for targeted policies and programs. There are long-term consequences for what occurs in the first-year of college with regard to the loan burdens students carry. Kim (2007) found that a heavier loan burden for first-year students has a negative effect on African and low-income students' graduation rates. Findings by Hart and Mustafa (2008) may help explain Kim's findings at a single institution. Of African American, Latina/o, and Asian American students, African Americans were the most likely to increase loan burdens in response to increased tuition, and for African American and Latinas/os, those with higher family incomes were the most likely to borrow, with Asian Americans the least likely to borrow (Hart & Mustafa).

Bannon and King (2002) argue that low-income and minority students and their families face a harsh reality with regard to debt incurred to attend college. Given the disproportionate number of historically underrepresented students of color among low-income college students, this represents a significant factor in how students of color access and experience the transition to college. Oliver and Shapiro's (1997) work on wealth disparities and the decreasing availability of grants and other need-based aid shows the vulnerability of students of color. The numbers of students of color enrolled in for-profit institutions continues to increase, particularly at 2 years for profits, highlighting the possibility that predatory lending practices have not been limited to the housing market and that they may be present in higher education. This is an area that deserves further attention among policy makers, lobbyists, and scholars as the dearth of scholarship on students of color enrolled in for-profit institutions leaves the higher education community largely silent on a growing sector of higher education worth billions in annual revenue with an unclear picture of how students of color may be uniquely affected, particularly with their transition to college.

Familial Financial Support

The families and parents of college students of color have strong desires to support their college attendance yet not always through means such as college saving plans or borrowing against equity in a home, popularized through the media and the

behaviors of middle-class families. Using NELS: 1988:2000, Tekleselassie (2010) found that compared to their White counterparts, African American parents are just as dedicated to helping fund their children's postsecondary education but plan to rely on borrowing or financial support from an extended familial network compared to White parents who plan to draw on savings and rely on their children working as a means to finance postsecondary education. McCallister, Evans and Illich (2010) found Latinas/os parenting middle-school age students had high educational aspirations for their children. However, the authors note that the parents who responded to their survey thought their children would receive academic scholarships to pay for college and had limited knowledge of other types of financial assistance and aid. McCallister et al.'s research is similar to recent polls by the Pew Hispanic Center (2010) about the increase in Latina/o parental degree aspirations for their children. Ceja (2006) refers to Latina/o students' parents and peers using Stanton-Salazar's concept of "protective agents" (p. 89) and highlights the significant role the students' siblings play in providing information about college. In addition to siblings, parents play a critical role in providing students with emotional and financial support. The financial support of parents is important for Asian American students as well. Kim and Gasman's (2011) exploration of Asian American students' college choice revealed that their participants' financial decisions were made in the context of their families financial situations, regardless of SES. Students reported having a desire to pay their families back for sacrifices made as part of their family's history of immigration to the US.

Undocumented and/or recently immigrated students face additional hurdles during the transition to college. Baum and Flores (2011) call attention to the complexities of the role of financial aid on students of color with recent immigration experiences. In particular, they outline how immigration status, first-generation college student status, limited parental knowledge about financial aid, and limited personal and family income create a perfect storm to limit students' accessing and successfully transitioning to college. The empirical work exploring the experiences of such students largely focuses on Latina/o students and focuses primarily on accessing college and the overall college experiences; few studies focus on the transition to college. However, the current work in this area does provide some insight into the transition to college for undocumented students: Those who are undocumented are often reliant on the benevolence of state policies regarding in-state tuition rates while remaining ineligible for federal financial aid (Flores, 2010). Undocumented students rely primarily on familial financial support and scholarships to finance their education (Baum & Flores, 2011; Diaz-Strong, Gomez, Luna-Duarte, & Meiner, 2011; Flores, 2010; Perez, 2011; Perez & Cortes, 2011). For such students, the transition to college may be particularly challenging as they work more and take fewer classes to negotiate the demands on their constrained time and finances (Diaz-Strong, et al. 2011). Nuñez's (2011) qualitative exploration of first-generation Latina/o college students' transition to college revealed that some undocumented students employ creative strategies to finance their education. For example, one student in the Nuñez study took on the role as a property caretaker for homeowners close to his campus in exchange for room and board.

Employment

Of the first-generation college students who were in the 12th grade in 1992 and enrolled in postsecondary education by 2000, 84.8% made \$50,000 a year or less, with half of all such students coming from families whose annual income was \$25,000 a year or less (Chen, 2005). Given the aforementioned disproportionate number of African American and Latina/o students who are first-generation college students, understanding linkages between first-generation status, work, and college transition is important. Moreover, African American, Latina/o, and Native American college students are working 35 or more hours per week at higher rates, 41.3%, 38.2%, and 37.4%, respectively, than their White counterparts at 32.75% (King, 2006).

All forms of employment are not associated with less-than-desirable outcomes (Erwin, 1996). Over the years, a number of financial aid/employment factors that mediate the potential negative effects on students' transition process such as students' year-to-year persistence have been identified (Furr & Elling, 2002; Nettles, 1991; Orfield, 1992). Employment while enrolled in college (Corrigan, 2003) and work-study employment may have benefits for students in college (Pascarella & Terenzini, 2005; Tinto, 1993). However, the number of hours worked per week (Furr & Elling) and where the student is employed off campus can have a negative effect on students (Nora, Cabrera, Hagedorn, & Pascarella, 1996).

Salisbury, Pascarella, Padgett and Blaich (2012) report that working in an off-campus job more than 20 hours a week leads to students' scoring higher on several dimensions of leadership, including individual characteristics, ability to work in a group, and commitment to social change. We do not know, however, if this finding would hold true for various racial/ethnic subgroups. Lohfink and Paulsen (2005), utilizing the BPS 96/01 dataset to examine year-to-year persistence at the beginning of college, found first-generation college students were more likely to work during the first year of college. Understanding the role of work in the transition to college is important for those students of color from lower income backgrounds who are first-generation college students in 4- or 2-year institutions.

Using NSSE data, Moore and Rago (2009) examined how students' employment affected their engagement in college environments. Their results reveal that Asian American students were most likely to work on campus and Latina/o and Native American students were less likely than other ethnic groups to work on campus. However, when Native Americans did work on their campus, they were the most likely to work 30 or more hours per week. Moore and Rago attribute this latter finding to the inclusion of tribal colleges in the sample, which probably have a greater preponderance of Native American staff who are pursuing degrees at institutions where they are employed. Latino and African American students were likely to be working 30 or more hours a week for an off-campus employer, while Asian Americans were one-third less likely to work 30 hours per week (Tuttle, McKinney, & Rago, 2005). This latter finding is important as subsequent research indicates that 20 hours a week might be a

threshold at which students' likelihood of persisting to the second year is negatively affected by employment (Bozick, 2007). DesJardins et al. (2010) found that African Americans and Asian American Gates Millennium Scholars work far less in the first year of college, and this pattern of working less continues through the junior year of college. For Latina/o GMS students, there was no change in work hours, and for Native Americans, a reduction in work hours is not seen until the junior year of college in this particular study.

If work has an indirect negative effect on course grades and GPA for students of color, as Svanum and Bigatti (2009) found in a mostly White sample of urban college students, it would behoove practitioners to consider structuring aid packages in the first year in ways that reduce the number of hours students work. Bowman's (2010) work showing that working 16 hours a week or more undermined students' development of critical thinking in the first year of college may help explain why Svanum and Bigatti found a negative effect of employment on GPA. However, working the first year in college does have its benefits; Bowman found working 16 or more hours had a positive effect on students' understanding of racially and ethnically diverse others. It may be that students who are working a substantial number of hours are also having opportunities for increased interactions with diverse others in an environment where the consequences of lack of positive relationships with diverse others are more dire and immediate (i.e., loss of employment and income) than in the college environment. James, Marrero, and Underwood's (2010) qualitative inquiry into the racial climate for African Americans students uncovered an element of the campus climate not often explored in the campus climate literature—the racial climate of students' on- and off-campus work sites. Students in this study reported experiences at work as an extension of racialized campus environments. This is an area that needs further attention by scholars, as understanding if this is a source of financial stress for students of color is important. Given that African American and Asian American college students place value on work that will earn them more money and expand their job possibilities (Duffy & Sedlacek, 2007), nuanced studies of how employment affects the transition to college for students of color become critical to providing support the first year in college.

Grubb has produced a number of empirical studies that examine a wide variety of topics related to financial aid and employment, particularly those that affect community college students. Some of these studies examine the community college environment from a much broader policy perspective than the focus of this chapter but remain relevant to understanding the transition to college for students of color. For example, a 1994 study examined remediation in the community college context. What is most relevant is the depth and breadth of Grubb and Kalman's (1994) list of agencies that participate in remedial education at the community college, including welfare-to-work programs and state correctional entities. This work has the potential to broaden how we think about financial support for students of color to more than financial aid and employment. These are important considerations in understanding financial policies that affect students of color.

The Evolution of Financial Aid Policy

Currently, the financial aid policies that most affect the educational outcomes of students of color include the current emphasis on merit-based aid, evolving student loan policies and the continual struggle to maintain or grow Pell grants. These policies in particular affect college students of color as the extant higher education literature strongly indicates that the decrease in need-based aid disproportionately affects students of color, possibly because of their overrepresentation among the low-income, as previously discussed.

Changing Tides at the Federal-Level Merit-Based Aid

Among scholars and policyholders, one aspect of financial aid where stakeholders agree has the negative effect is the shift from need- to merit-based aid on students of color accessing and graduating from college. In the early 1990s, scholars began to focus on how the decline of need-based aid constrained access to college (Orfield, 1992). Heller (2004) discusses the 1990s trends of increases in merit-based aid over need-based aid despite indications that historically underrepresented students of color access to college is best supported by need-based aid. Long and Riley (2007) emphasize the continued deleterious effect of a shift away from need-based aid on low-income students of color and cite increases in unmet needs as a driving factor limiting access for students of color. Griffith (2011) found that even at private institutions, an increased reliance on merit-based aid limits access for low-income students of color. However, some localized merit-based programs have had success in improving the situation for students of color. Harkreader, Hughes, Tozzi and Vanlandingham (2008) found that Florida's Bright Futures Scholarship had a positive effect on minority and low-income students' college going. It may be that offering more than one merit-based program, which Florida does, might provide greater financial support for college such that students' stress about paying for college is diminished in the early years. Conversely, Kentucky's merit-based aid program was found to create barriers for students, largely due to state policies surrounding the funding source for the Kentucky Education Excellence Scholarship (KEES) (Kash & Lasley, 2009). The work of Harkreader et al. and Kash and Lasley highlight how context affects merit-based aid programs and how the variation in state policy pose challenges to examining the effect of merit-based aid on students of color from a national perspective.

Summary of Finances and the College Transition Process

Oseguera, Locks and Vega (2009) suggested that for Latina/o students, financial matters should be considered in the transition to college process. The literature reviewed in this section supports this assertion across racial/ethnic groups. Examining financial

aid alone without other financial matters, such as students' financial literacy, context of student employment (full-time, part-time, etc.), and the financial role students play in the familial context, is insufficient for understanding the financial lives of people of color enrolled in postsecondary institutions. This focus therefore limits our understanding of how people of color experience the transition to college. For minority students, economic models used to examine the relationships between financial aid and the transition to college may be inadequate to explain the economic realities they face. Minorities are differentially affected by aid type in both the college-choice process (Fenske, Porter, & DuBrock, 2000) and in the process of transitioning to college (St. John, Paulsen, & Starkey, 1996; St. John & Starkey, 1995). St. John, Hu, Simmons, Carter and Weber's (2004) examination of how college major and financial aid work together to affect college students' persistence suggests that doing well in the first year and selecting a major by the second year of college is critical for African American student persistence.

First-Year Programs and Interventions

First-year experience programs have grown exponentially in the years since the early 1990s. The research in the extant higher education and related literature examines, qualitatively and quantitatively, the effect programs and interventions such as first-year seminars, federal TRIO programs, living-learning programs, supplemental instruction, and residence hall experiences have on students' transition to college. In our examination of the literature, scholars rarely include race/ethnicity as part of their analyses, so it is often difficult to discern how these programs may affect students of color specifically. Equally difficult to find are empirical studies that examine the experiences of students of color in institutional and federal programs designed to facilitate the successful transition to college. This section summarizes the studies by race and ethnicity or focus specifically on the experiences of students of color.

In the first year of college, Latina/o students who participate in educationally purposeful activities that include peer contact and interactions about diversity and academic content, faculty interactions outside of the classroom, and use of technology to complete course work have higher GPAs (Kuh et al., 2006a, 2006b). For African American students, their average or above average involvement with educationally purposeful activities increases the likelihood they will return to college for the second year. In both of these findings, the positive outcomes are greater for these groups of students. Their findings appear to be consistent across institution type. For example, at a private HBCU, students enrolled in a first-year learning community, which was organized in groups of 25 students who enrolled in three to four interconnected courses as cohort, were found to have higher scores on NSSE measures of active and collaborative learning, student-faculty interactions, and enhancing educational experiences and supportive campus environment than their counterparts who did not participate in the learning community (Yancy et al., 2008). Such

research supports first-year experience programs that provide students with opportunities to interact with diverse others, have contact with faculty outside of the classroom, and incorporate the use of technology during the first year of college.

Other orientation and academic programs that encourage active involvement and feature peer and staff interaction have been found to increase year-to-year persistence. Freshman orientation programs are found on many campuses and take place the summer before fall classes, at the beginning of a summer bridge program, or at the very start of the fall term and may include campus tours, course registration, and academic advising appointments. Some freshman orientation programs last longer than a day or two and are offered as formal courses or freshman seminars. Burgette and Magun-Jackson (2008–2009) found that of African American and White students who participated in freshman seminars, both racial groups saw higher year-to-year persistence rates through the beginning of the sophomore year and African American students saw the largest benefits when compared to their counterparts not enrolled in freshman seminars. Additionally, many campuses employ freshmen seminars that are discipline and field based. Engineering seminars have been found to improve students' self-efficacy, higher-order cognitive skills, and team work skills on a particular PWI campus (Sankar & Raju, 2011). Positive outcomes were found for students' engagement in their coursework when hands-on projects were used in engineering courses at a HBCU (Haylo & Le, 2011). This latter type of research is typically highlighted in discipline-specific journals focused on the pedagogical practices in specific fields.

Some first-year programs have particular foci, just as the aforementioned first-year seminars do, and are typically designed to ameliorate persistence challenges for higher education writ large as well as institutional challenges such as creating supportive and inclusive environments for racially and ethnically diverse STEM students. Findings from Good, Halpin and Halpin's (2001–2002) mixed-method inquiry focused on the effect of a STEM academic support program on its African American participants indicate that the program may be a protective factor from some of the typical climate issues these STEM students face as people of color. In particular, the qualitative portion of their study suggests that the participants may return for their second year in college in greater numbers than their nonprogram counterparts because they are socialized to seek out assistance early on in their academic careers as undergraduates (Good et al., 2001–2002). Their qualitative findings also suggest that the program increases the sense of belonging on campus, decreasing their isolation as students of color in engineering. Similarly, Reyes (2011) found that undergraduate research programs, specifically targeted for women of color interested in transferring from a 2- to 4-year colleges, were key in assisting students with their transition experiences. A further implication of this study was the need for campuses to implement special training programs for faculty in terms of pedagogy to assist students of color in general and especially those transferring from a community college.

Living on campus remains a significant predictor of sense of belonging (Locks et al., 2008) and year-to-year persistence for college students. In the first year of college, students of color, along with students who live on campus and are involved

with learning communities, are more likely to engage in volunteerism (Cruce & Moore, 2007). As the number of students living on campus continues to grow (by 16% between 1990 and 2000 according to the 2003 US Census), residential learning communities have grown, as well as the number of scholars examining the effects of student participation in such programs. However, many studies do not consider race in their design, analyses, or interpretation. Moreover, even fewer studies have as their primary focus the experiences of racially and ethnically diverse students. Of the studies that include experiences in residence halls, findings about a hostile racial climate (Ancis, Sedlacek, & Mohr, 2000; Yosso et al., 2009) and lower rates of engagement at PWIs are reported. For example, Arboleda, Wang, Shelley and Whalen (2003) found in their single institution study that minority students were less likely to be engaged in their residence halls.

Some first-year experience programs may be effective for students of color because of the unique culturally sensitive pedagogical practices employed by instructors and staff. Such is likely the case in the University of Texas at Austin's Preview Program where some English instructors use technology and subgroups with classes to facilitate students of color engaging with their same race peers around academic content (Canagarajah, 1997). Chhuon and Hudley (2008) explored the experiences of first-year Cambodian American college students, and their qualitative work revealed four major themes for how these students navigated their first year of college. Two of these themes were involvement in an Equal Opportunity Program (EOP) and membership in a student-initiated ethnic organization. Chhuon and Hudley make note that the advising and connections to staff students had access to through their involvement in EOP likely helped socialize the student to the campus as well as engage them in help-seeking behaviors. They also make clear that involvement in a student-initiated organization is distinct from other student organizations. Although the specific organization mentioned in Chhuon and Hudley's study did not have a formal goal to retain their members as student-initiated retention programs highlighted by Maldonado, Rhoads and Buenavista (2005) did, this program seemed to facilitate its members return to college for the sophomore year.

Future Research and Implications

The early years of college are important ones in the lives of all students and especially students of color. In addition to the common stress students experience when they enter a new institution, students of color, particularly those attending predominantly White institutions, often need to manage peer environments and faculty expectations that are different than the ones White students encounter. It is of critical interest to policy makers, researchers, and practitioners to reduce the disparity between racial/ethnic groups in terms of persistence to the second year of postsecondary education and persistence to the baccalaureate degree. The future of the US economy is dependent upon individuals completing higher education degrees in a

timely fashion and becoming contributing members of the US workforce. Indeed, the fastest growing occupations projected from 2010 to 2020 will be those jobs requiring master's degrees (Bureau of Labor Statistics, 2011). Certainly, successful completion of transition to college is the first step toward completing degrees and participating in the projected high-growth occupations.

This chapter discussed the major areas of theoretical emphasis of transition to college research. One main approach has been student socialization models whereby students adjust and change to fit the institution. This is often an appropriate framework, since students need to learn the academic expectations of college-level work in comparison to high school, but in instances where the new campus environment is hostile to students of color (Yosso et al., 2004), socialization models have their limitations in explaining how students can retain their racial/ethnic identities and self-efficacy and manage negative environments. We advocate additional theoretical considerations and paradigms whereby interdisciplinary approaches for understanding students' first-year experiences may assist in explaining student transition to college. For example, for some racial ethnic groups (particularly for first-generation students), using acculturation frameworks, which balance racial/ethnic identity and peer and faculty interactions, may help structure campus interventions focused on student success. Current frameworks that examine racial/ethnic identity and college student self-efficacy (e.g., stress and coping models) may hold promise for understanding students' transition to college when combined with other work on academic and financial dimensions of student transition to college (Cano & Castillo, 2010).

We also believe that significant research needs to be conducted using disaggregated ethnic groups. There is quite a lot of variation within the broadly categorized racial/ethnic groups, and it will help further research and help those structuring interventions for additional research on students of color to consider differences between gender, socioeconomic status, immigrant status, and ethnic group. Far too often, research has aggregated racial/ethnic groups, and given the complexity of student background experiences and how it affects experiences on-campus, good quality research—quantitative, qualitative, and mixed—is essential.

A strong area in need of further investigation is how to appropriately address academic and financial concerns as it pertains to students' first-year college experiences. Access to college literature (e.g., Perna, 2006; Perna & Titus, 2004, 2005; Tierney & Hagedorn, 2002) has demonstrated the barriers and mechanisms of support for students to gain entry to college and stay. Given the current economic climate for K-12 and public higher education, financing postsecondary education and strong academic preparation for college will continue to be two major issues continuing to affect student transition to college. As noted above, future research should include conceptualizations of academic metacognition. One particularly fruitful area of research would be to connect metacognition, self-efficacy, and racial climates for the outcomes of students of color.

We offer one methodological caution as we pursue investigation of students' transition to college. Gone are the days in which students finished high school, had a long summer break, and then enrolled in college for the first time. Current

enrollment patterns include students taking courses at colleges while in high school (e.g., dual enrollment programs) and enrolling in a course or two at one institution while maintaining student status at another institution, and nontraditional students often have course-taking patterns that include several stop-outs and periods of interruption (Ishitani, 2008). Researchers in higher education will need to design methodological strategies to determine, under these complex circumstances, what does “transition to college” mean? Perhaps institutions, particularly those in close proximity to each other, need to develop/recommit to consortia and combine efforts and think about transition to college options that help students from a variety of institutions learn the skills and orientations needed to be successful in a postsecondary environment. If institutions were able to share resources in this manner, this may have the net effect of improving college student preparation for transition to college for a greater number of students and reduce institutional duplication of effort. Such consortia might involve training faculty and staff in essential pedagogical and counseling strategies to help the increasingly diverse group of students who are predicted to enroll in higher education over the next several years.

References

- Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment*. Washington, DC: U.S. Department of Education, Office of Educational Research and Development.
- Adelman, C. (2004). *Principal indicators of student academic histories in postsecondary education, 1972–2000*. Washington, DC: U.S. Department of Education, Institute of Education Sciences.
- Allen, K. (2007). How fair is college financing that speaks Spanish first? *Education Digest: Essential Readings Condensed for Quick Review*, 72(9), 39–43.
- Allen, W. (1991). Introduction. In W. Allen, E. G. Epps, & N. Z. Haniff (Eds.), *College in Black and White* (pp. 1–14). Albany, NY: State University of New York Press.
- Allensworth, E., Nomi, T., Montgomery, N., & Lee, V. E. (2009). College preparatory curriculum for all: Academic consequences of requiring algebra and English I for ninth graders in Chicago. *Educational Evaluation & Policy Analysis*, 31(4), 367–391. doi:[10.3102/0162373709343471](https://doi.org/10.3102/0162373709343471).
- Alon, S. (2007). The influence of financial aid in leveling group differences in graduating from elite institutions. *Economics of Education Review*, 26(3), 296–311.
- Ancis, J. R., Sedlacek, W. E., & Mohr, J. J. (2000). Student perceptions of campus cultural climate by race. *Journal of Counseling and Development*, 78(2), 180–185.
- Anglin, D. M., & Wade, J. C. (2007). Racial socialization, racial identity, and Black students' adjustment to college. *Cultural Diversity and Ethnic Minority Psychology*, 13(3), 207–215.
- Arboleda, A., Wang, Y., Shelley, M. C., & Whalen, D. F. (2003). Predictors of residence hall involvement. *Journal of College Student Development*, 44(4), 517–531.
- Astin, A. (1985). *Achieving educational excellence: A critical assessment of priorities and practices in higher education*. San Francisco: Jossey-Bass.
- Attewell, P. (2001). The winner-take-all high school: Organizational adaptations to educational stratification. *Sociology of Education*, 74(4), 267–295.
- Attewell, P., Lavin, D., Domina, T., & Levey, T. (2005). New evidence on college remediation. *Journal of Higher Education*, 77(5), 886–924.
- Attinasi, L. C., Jr. (1989). Getting in: Mexican Americans' perceptions of university attendance and the implications for freshman year persistence. *Journal of Higher Education*, 60(3), 247–277.

- Aud, S., Hussar, W., Johnson, F., Kena, G., Roth, E., Manning, E., Wang, X., & Zhang, J. (2012). *The condition of education 2012* (NCES 2012–045). Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved June 30, 2012 from <http://nces.ed.gov/pubsearch>
- Allen, W. (1991). Introduction. In W. Allen, E. G. Epps, & N. Z. Haniff (Eds.), *College in Black and White* (pp. 1–14). Albany, NY: State University of New York Press.
- Baker, R. (1986, April). *The student adaptation to college questionnaire and its use in an intervention study with freshmen*. Paper presented at the annual meeting of the American College Personnel Association, New Orleans, LA.
- Baker, R. W., & Siryk, B. (1980). Alienation and freshman transition to college. *Journal of College Student Personnel*, 21(5), 437–442.
- Baker, R. W., & Siryk, B. (1984). Measuring adjustment to college. *Journal of Counseling Psychology*, 31(2), 179–189.
- Baker, R. W., & Siryk, B. (1989). *Student adaptation to college questionnaire manual*. Los Angeles: Western Psychological Services.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), 122–147.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1991). Self-regulation of motivation through anticipatory and self-reactive mechanisms. In Dienstbier, R. (Ed.), *Perspectives on motivation: Nebraska symposium on motivation, 1990* (Vol. 38, pp. 69–164). Lincoln, NE: University of Nebraska Press.
- Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist*, 28(2), 117–148.
- Bannon, E., & King, T. (2002). The burden of borrowing: Reversing the trend toward unmanageable student debt. *Student Aid Transcript*, 13(4), 49–53.
- Barlow, A. E. L., & Villarejo, M. (2004). Making a difference for minorities: Evaluation of an educational enrichment program. *Journal of Research in Science Teaching*, 41(9), 861–881. doi:[10.1002/tea.20029](https://doi.org/10.1002/tea.20029).
- Barry, C. L., & Finney, S. J. (2009). Can we feel confident in how we measure college confidence? A psychometric investigation of the college self-efficacy inventory. *Measurement and Evaluation in Counseling and Development*, 42(3), 197–222. doi:[10.1177/0748175609344095/](https://doi.org/10.1177/0748175609344095/).
- Baum, S., & Flores, S. M. (2011). Higher education and children in immigrant families. *The Future of Children*, 21(1), 171–193.
- Becker, G. (1964). *Human capital*. New York: National Bureau of Economic Research.
- Belenky, M., Clinchy, B., Goldberger, N., & Tarule, J. (1986). *Women's ways of knowing: The development of self, voice, and mind*. New York: Basic Books.
- Bell, A. D., Rowan-Kenyon, H. T., & Perna, L. W. (2009). College knowledge of 9th and 11th grade students: Variation by school and state context. *Journal of Higher Education*, 80(6), 663–685.
- Berger, J. B., & Milem, J. F. (1999). The role of student involvement and perceptions of integration in a causal model of student persistence. *Research in Higher Education*, 40(6), 641–664.
- Bettinger, E. P., & Long, B. T. (2004). *Shape up or ship out: The effects of remediation on students at four-year colleges* (Working Paper No. w10369). Cambridge, MA: National Bureau of Economic Research.
- Bettinger, E. P., & Long, B. T. (2009). Addressing the needs of underprepared students in higher education: Does college remediation work? *Journal of Human Resources*, 44(3), 736–771.
- Beyers, W., & Goossens, L. (2002). Concurrent and predictive validity of the student adaptation to college questionnaire in a sample of European freshman students. *Educational and Psychological Measurement*, 62(3), 527–538.
- Bong, M. (2001). Role of self-efficacy and task-value in predicting college students' course performance and future enrollment intentions. *Contemporary Educational Psychology*, 26(4), 553–570.

- Bourdieu, P. (1984). *Distinction: A social critique of the judgment of taste* (R. Nice, Trans.). Cambridge, MA: Harvard University Press. (Original work published 1979)
- Bourdieu, P., & Passeron, J.-C. (1979). *The inheritors: French students and their relation to culture* (R. Nice, Trans.). Chicago, IL: University of Chicago Press. (Original work published 1964)
- Bowman, N. A. (2010). The development of psychological well-being among first-year college students. *Journal of College Student Development*, 51(2), 180–200.
- Bozick, R. (2007). Making it through the first year of college: The role of students' economic resources, employment, and living arrangements. *Sociology of Education*, 80(3), 261–85.
- Bradum, E. M., Moen, P., & Dempster-McClain, D. (1995). Women's return to school following the transition to motherhood. *Social Forces*, 73(4), 1517–1551.
- Braxton, J. M., Hirschy, A. S., & McClendon, S. A. (2004). *Understanding and reducing college student departure* (ASHE-ERIC Higher Education Report, Vol 30. No 3). Adriana Kezar, Series Editor.
- Braxton, J. M., Sullivan, A. V., & Johnson, R. M. (1997). Appraising Tinto's theory of college student departure. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (pp. Vol. 12, pp. 107–164). New York: Agathon Press.
- Brown, S. D., Lent, R. W., & Larkin, K. C. (1989). Self-efficacy as a moderator of scholastic aptitude-academic performance relationships. *Journal of Vocational Behavior*, 75(1), 64–75.
- Bureau of Labor Statistics. (2011). Occupation outlook handbook: Overview of the 2010–20 projections. Retrieved from: <http://www.bls.gov/ooh/About/Projections-Overview.htm>
- Burgette, J. E., & Magun-Jackson, S. (2008). Freshman orientation, persistence, and achievement: A longitudinal analysis. *Journal of College Student Retention: Research, Theory and Practice*, 10(3), 235–263.
- Burris, C. C., Heubert, J. P., & Levin, H. M. (2006). Accelerating mathematics achievement using heterogeneous grouping. *American Educational Research Journal*, 43(1), 137–154. doi:10.3102/00028312043001105.
- Cabrera, A. F., Hagedorn, L. S., Nora, A., Pascarella, E., & Terenzini, P. T. (1999). Campus racial climate and the adjustment of students to college: A comparison between White students and African-American students. *Journal of Higher Education*, 70(2), 134–160.
- Cabrera, A. F., Nora, A., & Castaneda, M. B. (1992). The role of finances in the persistence process: A structural model. *Research in Higher Education*, 33(5), 571–593.
- Canagarajah, A. S. (1997). Safe houses in the contact zone: Coping strategies of African-American students in the academy. *College Composition and Communication*, 48(2), 173–196.
- Cano, M. A., & Castillo, L. G. (2010). The role of enculturation and acculturation on Latina college student distress. *Journal of Hispanics in Higher Education*, 9, 221–231. doi:10.1177/1538192710370899.
- Carter, P. (2005). *Keepin' it real: School success beyond Black and White*. Oxford: Oxford University Press.
- Carter, P. (2006). Straddling boundaries: Identity, culture, and school. *Sociology of Education*, 79(3), 304–328.
- Ceja, M. (2006). Understanding the role of parents and siblings as information sources in the college choice process of Chicana students. *Journal of College Student Development*, 47(1), 87–104.
- Chaves, C. (2006). Involvement, development, and retention theoretical foundations and potential extensions for adult community college students. *Community College Review*, 34(2), 139.
- Chavous, T. M., Bernat, D. H., Schmeelk-Cone, K., Caldwell, C. H., Kohn-Wood, L., & Zimmerman, M. A. (2003). Racial identity and academic attainment among African American adolescent. *Child Development*, 74, 1076–1090.
- Cheadle, J. E. (2008). Educational investment, family context, and children's math and reading growth from kindergarten through the third grade. *Sociology of Education*, 81(1), 1–31.
- Chemers, M. M., Hu, L., & Garcia, B. F. (2001). Academic self-efficacy and first year college student performance and adjustment. *Journal of Educational Psychology*, 93(1), 55–64. doi:10.1037/0022-0663.93.1.55.

- Chen, X. (2005). *First generation students in postsecondary education: A look at their college transcripts* (NCES 2005–171). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.
- Chhuon, V., & Hudley, C. (2008). Factors supporting Cambodian American students' successful adjustment into the university. *Journal of College Student Development*, 49(1), 15–30.
- Chickering, A. W., & Schlossberg, N. K. (1995). *Getting the most out of college*. Needham Heights, MA: Allyn and Bacon.
- Choi, N. (2005). Self-efficacy and self-concept as predictors of college students' academic performance. *Psychology in the Schools*, 42(2), 197–205. doi:[10.1002/pits.20048](https://doi.org/10.1002/pits.20048).
- Colyar, J. E., & Stich, A. E. (2011). Discourses of remediation: Low-income students and academic identities. *American Behavioral Scientist*, 55(2), 121–141. doi:[10.1177/0002764210381870](https://doi.org/10.1177/0002764210381870)
- Conley, D. (2008). Rethinking college readiness. *New Directions for Higher Education*, 144, 3–13.
- Cook, B., & King, J. E. (2005). *Improving lives through higher education: Campus programs and policies for low-income adults*. Washington, DC: Lumina Foundation for Education and American Council on Education Center for Policy Analysis
- Cooper, J., & Robinson, P. (1999). Promoting core skills and lifelong learning through cooperative learning. In E. Dunne (Ed.), *The learning society: International perspectives on core skills in higher education*. London: Kogan Paul.
- Corrigan, M. E. (2003). Beyond access: Persistence challenges and the diversity of low-income students. *New Directions for Higher Education*, 121, 25–34.
- Crisp, G., & Nora, A. (2010). Hispanic student success: Factors influencing the persistence and transfer decisions of Latino community college students enrolled in developmental education. *Research in Higher Education*, 51(2), 175–194.
- Cruce, T., Wolniak, G. C., Seifert, T. A., & Pascarella, E. T. (2006). Impacts of good practices on cognitive development, learning orientations, and graduate degree plans during the first year of college. *Journal of College Student Development*, 47(4), 365–383.
- Cruce, T. M., & Moore, J. V. I. I. (2007). First-year students' plans to volunteer: An examination of the predictors of community service participation. *Journal of College Student Development*, 48(6), 655–673.
- Dahmus, S., Bernardin, H. J., & Bernardin, K. (1992). Student adaptation to college questionnaire. *Measurement and Evaluation in Counseling and Development*, 25(3), 139–142.
- Deil-Amen, R., & Rosenbaum, J. E. (2002). The unintended consequences of stigma-free remediation. *Sociology of Education*, 75(3), 249–268.
- DesJardins, S. L., McCall, B. P., Ott, M., & Kim, J. (2010). A quasi-experimental investigation of how the Gates Millennium Scholars program is related to college students' time use and activities. *Educational Evaluation and Policy Analysis*, 32(4), 456–475.
- Diaz-Strong, D., Gómez, C., Luna-Duarte, M. E., & Meiners, E. R. (2011). Purged: Undocumented students, financial aid policies, and access to higher education. *Journal of Hispanic Higher Education*, 10, 107–119. doi:[10.1177/1538192711401917](https://doi.org/10.1177/1538192711401917).
- Duffy, R. D., & Sedlacek, W. E. (2007). The presence of and search for a calling: Connections to career development. *Journal of Vocational Behavior*, 70(3), 590–601.
- Durkheim, E. (1951). *Suicide*. New York: Free Press.
- England-Siegerdt, C. (2011). Do loans really expand opportunities for community college students? *Community College Journal of Research and Practice*, 35(1), 88–98.
- Erwin, T. D. (1996). Students' contribution to their college costs and intellectual development. *Research in Higher Education*, 25(2), 194–203.
- Fenske, R. H., Porter, J. D., & DuBrock, C. P. (2000). Tracking financial aid and persistence of women, minority, and needy students in science, engineering, and mathematics. *Research in Higher Education*, 41(1), 67–94.
- Flores, S. M. (2010). State Dream Acts: The effect of in-state resident tuition policies on the college enrollment of undocumented Latino students in the United States. *The Review of Higher Education*, 33(2), 239–283.
- Fordham, S. (1995). *Blacked out: Dilemmas of race, identity and success at capital high*. Chicago: University of Chicago Press.

- Fordham, S. (2008). Beyond capital high: On dual citizenship and the strange career of "acting white". *Anthropology & Education Quarterly*, 39(3), 227–246.
- Fordham, S., & Ogbu, J. U. (1986). Black students' school success: Coping with the "burden of 'acting white.'". *The Urban Review*, 18(3), 176–206.
- Fries-Britt, S. (1998). Moving beyond Black achiever isolation: Experiences of gifted Black collegians. *Journal of Higher Education*, 69(5), 556–576.
- Fries-Britt, S., & Griffin, K. (2007). The Black box: How high-achieving Black resist stereotypes about Black Americans. *Journal of College Student Development*, 48(5).
- Furr, S. R., & Elling, T. W. (2002). African-American students in a predominantly White university: Factors associated with retention. *College Student Journal*, 36(2), 188–202.
- Galbraith, M. W., & Shedd, P. E. (1990). Building skills and proficiencies of the community college instructor of adult learners. *Community College Review*, 18(2), 6–14.
- Getzlaf, S. B., Sedlacek, G. M., Kearney, K. A., & Blackwell, J. M. (1984). Two types of voluntary undergraduate attrition: Application of Tinto's model. *Research in Higher Education*, 20(3), 257–268.
- Giddings, P. (1996). *When and where I enter: The impact of Black women on race and sex in America*. New York: William Morrow.
- Gilligan, H. (2012). *An examination of the financial literacy of California college students*. Unpublished doctoral dissertation. Long Beach, CA: California State University.
- Gold, J., Burrell, S., Haynes, C., & Nardecchia, D. (1990). *Student adaptation to college as a predictor of academic success: An exploratory study of Black undergraduate education students* (Research Report 143). (ERIC Document Reproduction Service No. ED 331 946).
- Good, J., Halpin, G., & Halpin, G. (2001–2002). Retaining black students in engineering: Do minority programs have a longitudinal impact? *Journal of College Student Retention: Research, Theory & Practice*, 3(4), 351–364.
- Gorman, T. J. (1998). Social class and parental attitudes toward education – Resistance and conformity to schooling in the family. *Journal of Contemporary Ethnography*, 27(1), 10–44.
- Griffith, A. L. (2011). Keeping up with the Joneses: Institutional changes following the adoption of a merit aid policy. *Economics of Education Review*, 30(5), 1022–1033.
- Grubb, W. N., & Kalman, J. (1994). Relearning to earn – The role of remediation in vocational-education and job-training. *American Journal of Education*, 103(1), 54–93.
- Hackett, G., Betz, N. E., Casas, J. M., & Rocha-Singh, I. A. (1992). Gender, ethnicity, and social cognitive factors predicting the academic achievement of students in engineering. *Journal of Counseling Psychology*, 39(4), 527–538.
- Hallinan, M. T. (1994a). Tracking: From theory to practice. *Sociology of Education*, 67(2), 79–83.
- Hallinan, M. T. (1994b). School differences in tracking effects on achievement. *Social Forces*, 72(3), 799–820.
- Harkreader, S., Hughes, J., Tozzi, M. H., & Vanlandingham, G. (2008). The impact of Florida's Bright Futures Scholarship Program on high school performance and college enrollment. *Journal of Student Financial Aid*, 38(1), 5–16.
- Harper, S. R. (2006). Peer support for African American male college achievement: Beyond internalized racism and the burden of 'acting White'. *Journal of Men's Studies*, 14(3), 337–358.
- Hart, N. K., & Mustafa, S. (2008). What determines the amount students borrow? Revisiting the crisis-convenience debate. *Journal of Student Financial Aid*, 38(1), 17–32.
- Hawley, T. H., & Harris, T. A. (2005). Student characteristics related to persistence for first-year community college students. *Journal of College Student Retention*, 7(1–2), 117–142.
- Haylo, N., & Le, Q. (2011). Results of using multimedia case studies and open-ended hands-on design projects in an 'introduction to engineering' course at Hampton University. *Journal of STEM Education*, 12(7 & 8), 32–35.
- Heller, D. E. (2004). The changing nature of financial aid. *Academe*, 90(4), 36–38.
- Hilmer, M. J. (1998). Post-secondary fees and the decision to attend a university or a community college. *Journal of Public Economics*, 67(3), 329–348.
- Holmes, L. S., Ebbers, L. H., Robinson, D. C., & Mugenda, A. B. (2001). Validating African-American students at predominantly white institutions. *Journal of College Student Retention*, 2(1), 41–58.

- Horn, L., & Carrol, D. (1998). *Stopouts or stayouts? Undergraduates who leave college in their first year, NCES 1999-087*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Horvat, E. M., & Lewis, K. (2003). Reassessing the 'Burden of Acting White': The importance of peer groups in managing academic success. *Sociology of Education*, 76, 265-80.
- Horvat, E. M., & O'Connor, C. (Eds.). (2006). *Beyond acting White: Reframing the debate on Black student achievement*. Lanham, MD: Rowman and Littlefield.
- Hu, S. (2010). Scholarship awards, college choice, and student engagement in college activities: A study of high-achieving low-income students of color. *Journal of College Student Development*, 51(2), 151-162.
- Hu, S., & St. John, E. P. (2001). Student persistence in a public higher education system: Understanding racial and ethnic differences. *Journal of Higher Education*, 72(3), 265-286.
- Hurtado, S., & Carter, D. F. (1997). Effects of college transition and perceptions of the campus racial climate on Latino college students' sense of belonging. *Sociology of Education*, 70(4), 324-345.
- Hurtado, S., Carter, D. F., & Spuler, A. J. (1996). Latino student transition to college: Assessing difficulties and factors in successful adjustment. *Research in Higher Education*, 37(2), 135-157.
- Hurtado, S., Eagan, M. K., Cabrera, N. L., Lin, M. H., Park, J., & Lopez, M. (2008). Training future scientists: Predicting first-year minority participation in health science research. *Research in Higher Education*, 49(2), 126-152.
- Hurtado, S., Han, J. C., Sáenz, V. B., Espinosa, L., Cabrera, N., & Cerna, O. (2007). Predicting transition and adjustment to college: Biomedical and behavioral science aspirants' and minority students' first year of college. *Research in Higher Education*, 48(7), 841-887.
- Inkelas, K., & Weisman, J. (2003). Different by design: An examination of student outcomes among participants in three types of living-learning prognosis. *Journal of College Student Development*, 44, 335-368.
- Inkelas, K. K., Daver, Z. E., Vogt, K. E., & Leonard, J. B. (2007). Living-learning programs and first-generation college students' academic and social transition to college. *Research in Higher Education*, 48(4), 403-434. doi:10.1007/s11162-006-9031-6.
- Inkelas, K. K., & Soldner, M. (2011). Undergraduate living-learning programs and student outcomes. In J. Smart, & M. Paulsen (Eds.), *Handbook of theory and research* (Vol. 26, pp. 1-56). New York: Springer.
- Ishitani, T. T. (2008). How do transfers survive after "transfer shock"? A longitudinal study of transfer student departure at a four-year institution. *Research in Higher Education*, 49, 403-419. doi:10.1007/s11162-008-9091-x.
- Iturbide, M. I., Raffaelli, M., & Carlo, G. (2009). Protective effects of ethnic identity on Mexican American college students' psychological well-being. *Hispanic Journal of Behavioral Sciences*, 31, 536-552. doi:10.1177/0739986309345992.
- Jaeger, A. J., & Eagan, M. K., Jr. (2009). Unintended consequences: Examining the effect of part-time faculty members on associate's degree completion. *Community College Review*, 36(3), 167-194.
- James, V., Marreno, I., & Underwood, D. (2010). Branching out and coming back together: Exploring the undergraduate experiences of young Black women. *Harvard Educational Review*, 80(1), 61-73.
- Kaase, K. J. (1994, May). *Testing the limits of student adaptation to college questionnaire*. Paper presented at the Annual Forum of the Association for Institutional Research, New Orleans, LA (ERIC Document Reproduction Service No. 373619).
- Kalsner, L., & Pistole, M. C. (2003). College adjustment in a multiethnic sample: Attachment, separation-individuation, and ethnic identity. *Journal of College Student Development*, 44(1), 92-109.
- Kash, J. P., & Lasley, S. (2009). Defining merit: The impact of award structure on the distribution of merit aid. *Journal of Student Financial Aid*, 39(1), 30-40.
- Kim, D. (2007). The effect of loans on students' degree attainment: Differences by student and institutional characteristics. *Harvard Educational Review*, 77(1), 64-100.

- Kim, J. K., & Gasman, M. (2011). In search of a "Good College": Decisions and determinations behind Asian American students' college choice. *Journal of College Student Development*, 52(6), 706–728.
- King, J. E. (2006). *Working their way through college: Student employment and its impact on the college experience retrieved from American Council on Education*, <http://www.acenet.edu/AM/CM/ContentDisplay.cfm?ContentFileID=1618>
- Kozeracki, C. (2002). Issues in developmental education. *Community College Review*, 29(4), 83–100.
- Krosteng, M. V. (1992). Predicting persistence from the student adaptation to college questionnaire: Early warning or siren song? *Research in Higher Education*, 33(1), 99–111.
- Kuh, G. D., Kinzie, J., Cruce, T., Shoup, R., & Gonyea, R. M. (2006a). *Connecting the dots: Multifaceted analyses of the relationships between student engagement results from the NSSE, and the institutional practices and conditions that foster student success*. Bloomington, IN: Center for Postsecondary Research, Indiana University.
- Kuh, G. D., Kinzie, J., Cruce, T., Shoup, R., & Gonyea, R. M. (2006b). *Connecting the dots: Multifaceted analyses of the relationships between student engagement results from the NSSE, and the institutional practices and conditions that foster student success*. Bloomington, IN: Center for Postsecondary Research, Indiana University.
- Lapsley, D. K., & Edgerton, J. (2002). Separation-individuation, adult attachment style, and college adjustment. *Journal of Counseling and Development*, 80(4), 484–492.
- Lareau, A. (1987). Social class difference in family-school relationships: The importance of cultural capital. *Sociology of Education*, 60(2), 73–85.
- Lareau, A. (2003). *Unequal childhoods: Class, race, and family life*. Berkeley, CA: University of California Press.
- Lavin, D. E., & Weininger, E. (1998, March 19). *New admissions criteria at the City University of New York: Ethnic and enrollment consequences and Addendum: Their impact on women*. Report prepared for hearings of the New York City Council, Committee on Higher Education.
- Lent, R. W., Brown, S. D., & Larkin, K. C. (1984). Relation of self-efficacy expectations to academic achievement and persistence. *Journal of Counseling Psychology*, 31(3), 356–362.
- Lent, R. W., Brown, S. D., & Larkin, K. C. (1986). Self-efficacy in the prediction of academic performance and perceived career options. *Journal of Counseling Psychology*, 33(3), 265–269.
- Lent, R. W., Brown, S. D., & Larkin, K. C. (1987). Comparison of three theoretically derived variables in predicting career and academic behavior: Self-efficacy, interest congruence, and consequence thinking. *Journal of Counseling Psychology*, 34(3), 293–298.
- Levin, J. S. (2001). *Globalizing the community college: Strategies for change in the twenty first century*. New York: Palgrave.
- Li, Y., McCoy, E., Shelley, M. C., & Whalen, D. F. (2005). Contributors to student satisfaction with special program (fresh start) residence halls. *Journal of College Student Development*, 46(2), 176–192.
- Locks, A. M., & Gregerman, S. R. (2008). Undergraduate research as an institutional retention strategy. In R. Taraban & R. L. Blanton (Eds.), *To think and act like a scientist: Undergraduate research experiences and their effects* (pp. 11–32). New York: Teachers College Press.
- Locks, A. M., Hurtado, S., Bowman, N. A., & Oseguera, L. (2008). Extending notions of campus climate and diversity to students' transition to college. *The Review of Higher Education*, 31(3), 257–285.
- Lohfink, M. M., & Paulsen, M. B. (2005). Comparing the determinants of persistence for first-generation and continuing generation students. *Journal of College Student Development*, 46(4), 409–428.
- Long, B. T., & Riley, E. (2007). Financial aid: A broken bridge to college access? *Harvard Educational Review*, 77(1), 39–63.
- Lundberg, C. A., Schreiner, L. A., Hovaguimian, K. D., & Miller, S. S. (2007). First-generation status and student race/ethnicity as distinct predictors of student involvement and learning. *NASPA Journal*, 44(1), 57–83.
- MacCallum, M. (2008). Effect of financial aid processing policies on student enrollment, retention and success. *Journal of Student Financial Aid*, 37(2), 17–32.

- Maldonado, D. E. Z., Rhoads, R., & Buenavista, T. L. (2005). The student-initiated retention project: Theoretical contributions and the role of self-empowerment. *American Educational Research Journal*, 42(4), 605–638.
- Marcus, J. (2000). Revamping remedial education. *National CrossTalk*, 8, 1.
- Marks, H. M., & Robb, S. R. (2004). Community service in the transition: Shifts and continuities in participation from high school to college. *Journal of Higher Education*, 75(3), 307–339.
- Martin, A. J. (2009). Motivation and engagement across the academic life span: A developmental construct validity study of elementary school, high school, and university/college students. *Educational and Psychological Measurement*, 69(5), 794–82.
- Martínez Alemán, A. M. (2010). College women's female friendships: A longitudinal view. *Journal of Higher Education*, 81(5), 553–582.
- Mattanah, J. F., Hancock, G. R., & Brand, B. L. (2004). Parental attachment, separation-individuation and college student adjustment: A structural equation analysis of mediational effects. *Journal of Counseling Psychology*, 51(2), 213–225.
- McAtee, A. B., & Benschoff, J. M. (2006). Rural dislocated women in career transition: The importance of support and strategies. *Community College Journal of Research and Practice*, 30, 697–714. doi:[10.1080/10668920500207858](https://doi.org/10.1080/10668920500207858).
- McCabe, R. (2000). *No one to waste: A report to public decision-makers and community college leaders*. Washington, DC: American Association of Community Colleges, Community College Press.
- McCallister, L., Evans, J., & Illich, P. (2010). Perceptions about higher education among parents of Hispanic students in middle school: Implications for community colleges. *Community College Journal of Research and Practice*, 34(10), 784–796.
- McDonough, P., & Calderon, S. (2006). The meaning of money: Perceptual differences between college counselors and low income families about college costs and financial aid. *American Behavioral Scientist*, 49(12), 1703–1718.
- Mendoza, P., Mendez, J. P., & Malcolm, Z. (2009). Financial aid and persistence in community colleges: Assessing the effectiveness of federal and state financial aid programs in Oklahoma. *Community College Review*, 37(2), 112–135.
- Merisotis, J., & Phipps, R. (2000). Remedial education in colleges and universities: What's really going on? *The Review of Higher Education*, 24(1), 67–85.
- Merker, B. M., & Smith, J. V. (2001). Validity of the MMPI-2 college maladjustment scale. *Journal of College Counseling*, 4(1), 3–9.
- Moore, J. V., & Rago, M. (2009). The impact of employment on student engagement: Results from NSSE. In B. Perozzi (Ed.), *Enhancing student learning through college employment* (pp. 87–107). Bloomington, IN: Association of College Unions International.
- Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of Counseling Psychology*, 38(1), 30–38.
- Murr, C. (2010). A scholarship workshop program to improve underrepresented student access to higher education. *Journal of Student Financial Aid*, 40(2), 30–40.
- Myers, R. D. (2003). *College success programs*. Washington, DC: Pathways to College Network Clearinghouse.
- National Survey of Student Engagement. (2009). *Assessment for improvement: Tracking student engagement over time—Annual results 2009*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- Nettles, M. T. (1991). Racial similarities and differences in the predictor of college student achievement. In W. R. Allen, E. Epps, & N. Z. Haniff (Eds.), *College in Black and White: African American students in predominantly White and in Historically Black Public Universities* (pp. 75–91). Albany, NY: State University of New York Press.
- Nora, A., Barlow, L., & Crisp, G. (2006). An assessment of Hispanic students in four-year institutions of higher education. In A. M. Gloria, J. Castellanos, & M. Kamimura (Eds.), *The Latina/o pathway to the Ph.D.: Abriendo caminos* (pp. 55–78). Sterling, VA: Stylus.

- Nora, A., Cabrera, A., Hagedorn, L. S., & Pascarella, E. (1996). Differential impacts of academic and social experiences on college-related behavioral outcomes across different ethnic and gender groups at four-year institutions. *Research in Higher Education*, 37(4), 427–451.
- Núñez, A. (2009). Latino students' transitions to college: A social and intercultural capital perspective. *Harvard Educational Review*, 79(1), 22–48.
- Núñez, A. (2011). Counterspaces and connections in college transitions: First-generation Latino students' perspectives on Chicano studies. *Journal of College Student Development*, 56(2), 639–655. doi:10.1353/csd.2011.0077.
- Nyrienda, S. M., & Gong, T. (2009–2010). The squishy and stubborn problem of retention: A study of a mid at an Mid-Atlantic Historically Black Institution with a land-grant mission. *Journal of College Student Retention*, 11(4), 529–550.
- O'Connor, C., Mueller, J., Lewis, R. L., Rivas-Drake, D., & Rosenberg, S. (2011). "Being" Black and strategizing for excellence in a racially stratified academic hierarchy. *American Educational Research Journal*, 48(6), 1232–1257.
- Oakes, J. (1994). More than misapplied technology: A normative and political response to Hallinan on tracking. *Sociology of Education*, 67(2), 84–88.
- Oakes, J. (1995). Two cities' tracking and within-school segregation. *Teachers College Record*, 96(4), 681–690.
- Oakes, J., Wells, A. S., Jones, M., & Datnow, A. (1997). Detracking: The social construction of ability, cultural politics, and resistance to reform. *Teachers College Record*, 98(3), 483–510.
- Ogbu, J. U. (1987). Variability in minority school performance: A problem in search of an explanation. *Anthropology and Education Quarterly*, 18(4), 312–334.
- Ogbu, J. U., & Davis, A. (2003). *Black American students in an affluent suburb: A study of academic disengagement*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Oliver, M., & Shapiro, T. (1997). *Black wealth, White wealth: A new perspective on racial inequality*. New York: Routledge.
- Orbe, M. P., & Groscurth, C. R. (2004). A co-cultural theoretical analysis of communicating on campus and at home: Exploring the negotiation strategies of first generation college (FGC) students. *Qualitative Research Reports in Communication*, 5, 41–47.
- Orfield, G. (1992). Money, equity, and college access. *Harvard Educational Review*, 62(3), 337–372.
- Oseguera, L., Denson, N., & Hurtado, S. (2008). Hispanic students and the Gates Millennium Scholarship Program: Promising results extending to the third college year. *Journal of College Student Retention: Research, Theory & Practice*, 10(3), 307–338.
- Oseguera, L. O., Locks, A. M., & Vega, I. I. (2009). Increasing Latina/o students baccalaureate attainment: A focus on retention. *Journal of Hispanics in Higher Education*, 8(1), 23–53.
- Owen, S. V., & Froman, R. D. (1988, April). *Development of a college academic self-efficacy scale*. Paper presented at the annual meeting of the National Council on Measurement in Education, New Orleans, LA.
- Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, 6(4), 543–578. doi:10.3102/00346543066004543.
- Pascarella, E. T., Pierson, C. T., Wolniak, G. C., & Terenzini, P. T. (2004). First-generation college students: Additional evidence on college experiences and outcomes. *Journal of Higher Education*, 75(3), 249–284.
- Pascarella, E. T., & Terenzini, P. T. (1980). Predicting freshman persistence and voluntary dropout decisions from a theoretical model. *Journal of Higher Education*, 51(1), 60–75.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research* (2nd ed.). San Francisco: Jossey-Bass.
- Passell, J. S., & Cohn, D. (2008). *U.S. population projections: 2005–2050*. Retrieved from The Pew Hispanic Center website, <http://pewsocialtrends.org/files/2010/10/85.pdf>
- Perez, W. (2011). *Americans by heart: Undocumented Latino students and the promise of higher education*. New York: Teachers College Press.
- Perez, W., & Cortes, R. D. (2011). *Undocumented Latino college students: Their socioemotional and academic experiences*. El Paso, TX: LFB Publishing.

- Perna, L. W. (2006). Studying college choice: A proposed conceptual model. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 21, pp. 99–157). Dordrecht, The Netherlands/London: Springer.
- Perna, L. W., & Titus, M. (2004). Understanding differences in the choice of college attended: The role of state public policies. *The Review of Higher Education*, 27(4), 501–525.
- Perna, L. W., & Titus, M. (2005). The relationship between parental involvement as social capital and college enrollment: An examination of racial/ethnic group differences. *Journal of Higher Education*, 76(5), 485–518.
- Ramos-Sanchez, L., & Nichols, L. (2007). Self-efficacy of first-generation and non-first-generation college students: The relationship with academic performance and college adjustment. *Journal of College Counseling*, 10(1), 6–18. doi:[10.1002/j.2161-1882.2007.tb00002.x](https://doi.org/10.1002/j.2161-1882.2007.tb00002.x).
- Rayle, A. D., Kurpius, S. E. R., & Arredondo, P. (2007). Relationships of self-beliefs, social support, and university comfort with academic success of freshman college women. *Journal of College Student Retention: Research, Theory, and Practice*, 8(3), 325–343.
- Reid, M. J., & Moore, J. L. (2008). College readiness and academic preparation for postsecondary education: Oral histories of first-generation urban college students. *Urban Education*, 43(2), 240–261.
- Rendón, L. I. (1994). Validating cultural diverse students: Toward a new model of learning and student development. *Innovative Higher Education*, 19(1), 3–51. doi:[10.1007/BF01191156](https://doi.org/10.1007/BF01191156).
- Rendón, L. I. (2002). Community College Puente: A validating model of education. *Educational Policy*, 16(4), 642–667.
- Rendón, L. I., Hope, R., & Associates. (1996). *Educating a new majority: Transforming America's educational system for diversity*. San Francisco, CA: Jossey-Bass.
- Reyes, M. E. (2000). What does it take? Successful Alaska Native students at the University of Alaska Fairbanks. *Journal of College Student Retention*, 2(2), 141–159.
- Reyes, M.-E. (2011). Unique challenges for women of color in STEM transferring from community college to universities. *Harvard Educational Review*, 81(2), 241–263.
- Rice, K. G., Fitzgerald, D. P., Whaley, T. J., & Gibbs, C. L. (1995). Cross-sectional and longitudinal examination of attachment, separation-individuation, and college student adjustment. *Journal of Counseling and Development*, 73(4), 463–474.
- Robinson, J. P. (2008). Evidence of a differential effect of ability grouping on the reading achievement growth of language-minority Hispanics. *Educational Evaluation and Policy Analysis*, 30(2), 141–180. doi:[10.3102/0162373708317742](https://doi.org/10.3102/0162373708317742).
- Rosenbaum, J. (2001). *Beyond college for all*. New York: Russell Sage.
- Roueche, J., & Roueche, S. (1999). *High stakes, high performance: Making remedial education work*. Washington, DC: Community College Press.
- Rowley, S. A. J., Sellers, R. M., Chavous, T. M., & Smith, M. (1998). The relationship between racial identity and self-esteem in African American college and high school students. *Journal of Personality and Social Psychology*, 74(3), 715–724.
- Rubin, B. C. (2003). Unpacking detracking: When progressive pedagogy meets students' social worlds. *American Educational Research Journal*, 40(2), 539–573.
- Ruiz, S., Sharkness, J., Kelley, K., DeAngleo, L., & Pryor, J. (2010). *Findings from the 2009 administration of Your First College Year (YFCY): National aggregates*. Los Angeles, CA: University of California, Los Angeles, Higher Education Research Institute.
- Salisbury, M. H., Pascarella, E. T., Padgett, R. D., & Blaich, C. (2012). The effects of work on leadership development among first-year college students. *Journal of College Student Development*, 53(2), 300–324.
- Sanchez, B., Esparza, P., Colon, Y., & Davis, K. E. (2010). Tryin' to make it during the transition from high school: The role of family obligation attitudes and economic context for Latino-emerging adults. *Journal of Adolescent Research*, 25(6), 858–884.
- Sankar, C. S., & Raju, P. K. (2011). Use of presage-pedagogy-process-product model to assess the effectiveness of case study methodology in achieving learning outcomes. *Journal of STEM Education*, 12(7 & 8), 45–56.

- Schaefer, J. L. (2010). Voices of older baby boomer students: Supporting their transitions back into college. *Educational Gerontology*, 36(1), 67–90.
- Schlossberg, N. K. (1981). A model for analyzing human adaptation to transition. *The Counseling Psychologist*, 9(2), 2–18.
- Schlossberg, N. K. (1984). *Counseling adults in transitions*. New York: Springer Publishing Company.
- Schlossberg, N. K., Waters, E. B., & Goodman, J. (1995). *Counseling adults in transition: Linking practice with theory* (2nd ed.). New York: Springer.
- Schneider, M. E., & Ward, D. J. (2003). The role of ethnic identification and perceived social support in Latinos' adjustment to college. *Hispanic Journal of Behavioral Sciences*, 25(4), 539–554.
- Schwartz, R. A., & Washington, C. M. (2001). Predicting academic performance and retention among African American freshmen men. *NASPA Journal*, 39(4), 354–370.
- Sellers, R. M., Chavous, T. M., & Cooke, D. Y. (1998). Racial ideology and racial centrality as predictors of African American college students' academic performance. *Journal of Black Psychology*, 24(1), 8–27.
- Shaw, K. M., & London, H. B. (2001). Culture and ideology in keeping transfer commitment: Three community colleges. *The Review of Higher Education*, 25, 91–114.
- Shim, S., Barber, B. L., Card, N. A., Xiao, J. J., & Serido, J. (2010). Financial socialization of first-year college students: The roles of parents, work, and education. *Journal of Youth and Adolescence*, 39(12), 1457–1470.
- Smedley, B. D., Myers, H. F., & Harrell, S. P. (1993). Minority-status stresses and the college adjustment of ethnic minority freshmen. *Journal of Higher Education*, 64(4), 434–452.
- Smith, A. K., Carmack, H. J., & Titsworth, B. S. (2006). Managing the tension of In(ter) dependence: Communication and the socialization of first-year college students. *Journal of The First-Year Experience & Students in Transition*, 18(2), 83–109.
- Solberg, V. S., O'Brien, K., Villareal, P., Kennel, R., & Davis, B. (1993). Self-efficacy and Hispanic college students: Validation of the college self-efficacy instrument. *Hispanic Journal of Behavioral Sciences*, 15, 180–195. doi:10.1177/07399863930151004.
- Soliday, M. (2002). *The politics of remediation*. Pittsburgh, PA: University of Pittsburgh Press.
- Solórzano, D., Ceja, M., & Yosso, T. (2000). Critical race theory, racial microaggressions, and campus racial climate: The experiences of African-American college students. *The Journal of Negro Education*, 69(1/2), 60–73.
- Soucy, N., & Larose, S. (2000). Attachment and control in family and mentoring contexts as determinants of adolescent adjustment at college. *Journal of Family Psychology*, 14(1), 125–143.
- Spady, W. (1970). Dropouts from higher education: An interdisciplinary review and synthesis. *Interchange*, 1(1), 64–85.
- Spady, W. (1971). Dropouts from higher education: Toward an empirical model. *Interchange*, 2(3), 38–62.
- St. John, E. P. (1991). What really influences minority attendance? Sequential analyses of the high school and beyond sophomore cohort. *Research in Higher Education*, 32(2), 141–158.
- St. John, E. P. (2003). *Refinancing the college dream: Access, equal opportunity, and justice for taxpayers*. Baltimore, MD: Johns Hopkins University Press.
- St. John, E. P. (2012). Academic capital formation: An emergent theory. In R. Winkle-Wagner, E.P. St. John, & P. Bowman (Eds.), *Expanding postsecondary opportunity for underrepresented students: Theory and practice of academic capital formation*. (Readings on equal education series, Vol. 26, pp. 3–28). New York: AMS Press Inc.
- St. John, E. P., Fisher, A. S., & Hu, S. (2011). *Breaking through the access barrier: Academic capital formation informing public policy*. New York: Routledge.
- St. John, E. P., Hu, S., Simmons, A., Carter, D. F., & Weber, J. (2004). What difference does a major make? The influence of college major field on persistence by African American and White students. *Research in Higher Education*, 45(3), 209–232.
- St. John, E. P., & Noell, J. (1989). The effects of student financial aid on access to higher education: An analysis of progress with special consideration of minority enrollment. *Research in Higher Education*, 30(6), 563–581.

- St. John, E. P., Paulsen, M. B., & Starkey, J. B. (1996). The nexus between college choice and persistence. *Research in Higher Education*, 37(2), 175–220.
- St. John, E. P., & Starkey, J. B. (1995). An alternative to net price: Assessing the influence of prices and subsidies on within-year persistence. *Journal of Higher Education*, 66(2), 156–186.
- Stage, F. K., & Rushin, P. W. (1993). A combined model of student predisposition to college and persistence in college. *Journal of College Student Development*, 34(4), 276–282.
- Stanton-Salazar, R. D. (2004). Social capital among working-class minority students. In M. A. Gibson, P. Gandara, & J. P. Koyama (Eds.), *School connections: U.S.-Mexican youth, peers, and school achievement*. New York: Teachers College Press, Columbia University.
- Svanum, S., & Bigatti, S. M. (2009). Academic course engagement during one semester forecasts college success: Engaged students are more likely to earn a degree, do it faster, and do it better. *Journal of College Student Development*, 50(1), 120–132.
- Tao, S., Dong, Q., Pratt, M. W., Hunsberger, B., & Pancer, S. M. (2000). Social support: Relations to coping and adjustment during the transition to university in the People's Republic of China. *Journal of Adolescent Research*, 15(1), 123–144.
- Tekleselassie, A. A. (2010). Demystifying conventional assumptions: Do African American parents anticipate investing less toward their children's college costs than their white peers? *Journal of Student Financial Aid*, 40(2), 5–20.
- Terenzini, P., Rendón, L. I., Upcraft, L., Millar, S., Allison, K., Gregg, P., & Jalomo, R. (1994). The transition to college: Diverse students, diverse stories. *Research in Higher Education*, 35(1), 57–73. doi:[10.1007/BF02496662](https://doi.org/10.1007/BF02496662).
- Terenzini, P. T., & Wright, T. M. (1987). Influences on students' academic growth during four years of college. *Research in Higher Education*, 26(2), 161–179.
- Tierney, W. G. (1992). An anthropological analysis of student participation in college. *Journal of Higher Education*, 62(6), 603–617.
- Tierney, W. G. (1998). Models of minority college going and retention: Cultural integrity versus cultural suicide. *The Journal of Negro Education*, 68(1), 80–91.
- Tierney, W. G., Corwin, Z. B., & Colyar, J. E. (Eds.). (2004). *Preparing for college: Nine elements of effective outreach*. Albany: State University of New York Press.
- Tierney, W., & Hagedorn, L. (Eds.). (2002). *Increasing access to college: Extending possibilities for all students*. Albany, NY: State University of New York Press.
- Tierney, W. G., Sallee, M. W., & Venegas, K. M. (2007). Access and financial aid: How American-Indian students pay for college. *Journal of College Admission*, 197, 14–23.
- Tinto, V. (1975). Dropouts from higher education: A theoretical synthesis of the recent literature. *A Review of Educational Research*, 45, 89–125.
- Tinto, V. (1987). *Leaving college: Rethinking the causes and cures of student attrition*. Chicago: University of Chicago Press.
- Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago: The University of Chicago Press.
- Torres, J. B., & Solberg, V. S. (2001). Role of self-efficacy, stress, social integration, and family support in Latino college student persistence and health. *Journal of Vocational Behavior*, 59(1), 53–63.
- Tovar, E., & Simon, M. A. (2006). Academic probation as a dangerous opportunity: Factors influencing diverse college students' success. *Community College Journal of Research and Practice*, 30(7), 547–564. doi:[10.1080/10668920500208237](https://doi.org/10.1080/10668920500208237).
- Trombley, W. (1998). Remedial education under attack. *National CrossTalk*, 6(3).
- Tuttle, T., McKinney, J., & Rago, M. (2005, April). *College students working: The choice nexus*. IPAS (Indiana Project on Academic Success) Topic Brief.
- Tyson, K. (2002). Weighing in: Elementary-age students and the debate on attitudes toward school among Black students. *Social Forces*, 80(4), 1157–1189.
- Tyson, K., Darity, W., & Castellino, D. R. (2005). It's not a "black thing": Understanding the burden of acting white and other dilemmas of high achievement. *American Sociological Review*, 70(4), 582–605.
- Umbach, P. D. (2007). How effective are they? Exploring the impact of contingent faculty on undergraduate education. *The Review of Higher Education*, 30(2), 91–124.

- Van Gennep, A. (1960). *Rites of passage*, (M. B. Vizedom & G. L. Caffee, Trans.), with an introduction by Solon T. Kimball. Chicago, IL: University Of Chicago Press.
- Villarejo, M., Barlow, A. E. L., Kogan, D., Veazey, B. D., & Sweeney, J. K. (2008). Encouraging minority undergraduates to choose sciences careers: Career paths survey results. *Cell Biology Education Life Sciences Education*, 7(4), 394–409. doi:[10.1187/cbe.08-04-0018](https://doi.org/10.1187/cbe.08-04-0018).
- Warburton, E. C., Bugarin, R., & Nuñez, A. M. (2001). *Bridging the gap: Academic preparation and postsecondary success of first-generation students* (Rep. No. NCES 2001–153). Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Wei, C. C., Berkner, L., He, S., Lew, S., Cominole, M., & Siegel, P. (2009). *2007–08 National Postsecondary Student Aid Study (NPSAS:08): Student financial aid estimates for 2007–08: First look* (NCES 2009–166). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
- Weidman, J. C. (1989). Undergraduate socialization: A conceptual approach. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 5, pp. 289–322). New York: Agathon Press.
- Weidman, J. C. (2006). Socialization of students in higher education: Organizational perspectives. In C. Conrad & R. C. Serlin (Eds.), *The Sage handbook for research in education: Engaging ideas and enriching inquiry* (pp. 253–262). Thousand Oaks, CA: Sage Publications.
- Welner, K. G., & Oakes, J. (1996). (Li)Ability grouping: The new susceptibility of school tracking systems to legal challenges. *Harvard Educational Research*, 66(3), 451–471.
- White, J. W., & Lowenthal, P. R. (2011). Minority college students and tacit “codes of power”: Developing academic discourse and identities. *The Review of Higher Education*, 34(2), 283–318. doi:[10.1353/rhe.2010.0028](https://doi.org/10.1353/rhe.2010.0028).
- Winkle-Wagner, R. (2009a). *The unchosen me: Race, gender, and identity among Black women in college*. Baltimore, MD: Johns Hopkins University Press.
- Winkle-Wagner, R. (2009b). The perpetual homelessness of college experiences: The tensions between home and campus for African American women. *The Review of Higher Education*, 33(1), 1–36.
- Winkle-Wagner, R. (2010). *Cultural capital: The uses and abuses of a key theoretical concept in educational research*. ASHE Higher Education Report Series, 36(1). San Francisco, CA: Jossey-Bass.
- Winkle-Wagner, R. (2012). Academic capital formation: Can it help untangle the confusion about social stratification in the study of college students? In R. Winkle-Wagner, E. P. St John, & P. Bowman (Eds.), *Expanding postsecondary opportunity for underrepresented students: Theory and practice of academic capital formation* (Readings on equal education series, Vol. 26). New York: AMS Press Inc.
- Winkle-Wagner, R., St. John, E., & Bowman, P. (Eds.) (2012). *Expanding postsecondary opportunity for underrepresented students: Theory and practice of academic capital formation* (Readings on equal education Series, 26). New York: AMS Press.
- Yancy, D. C., Sutton-Haywood, M., Hermitte, E., Dawkins, P. W., Rainey, K., & Parker, F. E. (2008). The impact of the freshman academy/learning communities on student progression and engagement. *The Journal of Negro Education*, 77(3), 250–263.
- Yazedjian, A., Toews, M. L., & Navarro, A. (2009). Exploring parental factors, adjustment, and academic achievement among White and Hispanic college students. *Journal of College Student Development*, 50(4), 458–467. doi:[10.1353/csd.0.0080](https://doi.org/10.1353/csd.0.0080).
- Yonezawa, S., Wells, A. S., & Serna, I. (2002). Choosing tracking: “Freedom of choice” in detracking schools. *American Educational Research Journal*, 39(37), 37–67.
- Yosso, T. J., Parker, L., Solórzano, D. G., & Lynn, M. (2004). From Jim Crow to affirmative action and back again: A critical race discussion of racialized rationales and access to higher education. *Review of Research in Education*, 28, 1–25.
- Yosso, T. J., Smith, W. A., Ceja, M., & Solórzano, D. G. (2009). Critical race theory, racial micro-aggressions, and campus racial climate for Latina/o undergraduates. *Harvard Educational Review*, 79(4), 659–691.
- Zajacova, A., Lynch, S. M., & Espenshade, T. J. (2005). Self-efficacy, stress, and academic success in college. *Research in Higher Education*, 46(6), 677–706. doi:[10.1007/s11162-004-4139-z](https://doi.org/10.1007/s11162-004-4139-z).

- Zeldin, A. M., & Pajares, F. (2000). Against the odds: Self-efficacy beliefs of women in mathematical, scientific, and technological careers. *American Educational Research Journal*, 37(1), 215–246. doi:[10.3102/00028312037001215](https://doi.org/10.3102/00028312037001215).
- Zimmerman, B. J. (1990). Self-regulating academic learning and achievement: The emergence of a social cognitive perspective. *Educational Psychology Review*, 2(2), 173–201. doi:[10.1007/BF01322178](https://doi.org/10.1007/BF01322178).
- Zimmerman, B. J., Bandura, A., & Matinez-Pons, M. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. *American Educational Research Journal*, 29(3), 663–676.

Chapter 4

Social Networks Research in Higher Education

Susan Biancani and Daniel A. McFarland

Introduction

In the last 30 years, social network analysis (SNA) has grown from a specialized method, used within a small niche of the social sciences, to a popular suite of techniques, applied to research questions across fields (see Scott, 2000; Knoke & Yang, 2008 for review). SNA is the study of relationships and associations—the stuff of social and organizational lives. To the extent that higher education institutions and the activities within them are rooted in relations, social networks matter. Moreover, by focusing on the connections among people and among organizations, SNA allows researchers to move beyond the methodological individualism that has characterized much of educational and social scientific research in the past century, broadening and enriching a social understanding of higher education settings. Finally, with the advent of new, extensive relational data sources, including institutional records, e-mail corpora, online learning communities, and social networking websites, researchers will have more opportunity than ever before to investigate the social networks among students, faculty, and staff at colleges and universities.

SNA has the potential to illuminate both the inner workings of the university as well as how it interrelates with society. A university is a complex organization, housing interactions among students, faculty, staff, and administrators and responding to demands from parents, funders, the government, and industry. Universities play many roles in society, none of which can truly be divorced from each other or from its educational mission. Higher education research has been a relative late-comer to the study of social networks, but it too has begun to embrace SNA and the unique insights these methods can bring.

S. Biancani • D.A. McFarland, Ph.D. (✉)
School of Education, Stanford University, 485 Lasuen Mall,
Stanford, CA 94305, USA
e-mail: biancani@stanford.edu; mcfarland@stanford.edu

Social network analysis of higher education institutions began with early work on student and faculty networks. Much of this entailed descriptions of student relations in dorms (Festinger, Schachter, & Back, 1950; Newcomb, 1961) or faculty collaborations in departments (Friedkin, 1978). While its roots are deep, SNA in higher education still looks like an emerging field: there is no well-defined and cohesive community of scholars who collaborate in this area. Rather, there are multiple hot spots of activity applying network analytic techniques to topics in higher education and drawing on frames from a variety of social science fields.

In higher education journals, we find SNA research on college diversity and the role that exposure to a diverse student body—and especially to a roommate of a different race or ethnicity—can have on students' attitudes on race. This work intersects with closely related questions in the field of social psychology and intergroup relations. We also find studies on the exchange of students between different countries, studies of collaboration among students, and studies of the ways in which a variety of ties—between roommates, classmates, friends, and others—can impact college retention and achievement. A closely related body of work, published mostly in economics journals, examines how ties to classmates, and particularly to roommates, can impact grades and other behaviors in college.

The sociological literature examines friendship formation in college, particularly the complementary roles of homophily and propinquity, and offers illustrations of how friendship networks can evolve over time. Sociology also tells us much about social networks among professors, their patterns of collaboration, and the ways in which they influence each other. The literature on scientific collaboration spills over into several related fields: from social networks specialty journals and economics, to information science, and to entrepreneurship and strategy. This latter field additionally investigates ties between universities and industry and the effect these may have on the nature of scholarship. Together, this literature offers a multifaceted view of institutions of higher education and of the people who live, work, and study in them.

This chapter describes the literature on social networks in higher education from both an analytical and empirical perspective. By analytically carving up the concept space of social networks research in higher education, we hope to provide scholars with a greater awareness of their shared concerns and of opportunities to learn from related work. By empirically identifying how this body of research is organized, we hope to show where boundaries form and to reflect on whether those boundaries are a help or hindrance to the advancement of knowledge in the area.

Identifying the Corpus of Social Networks Research in Higher Education

We selected texts from a variety of fields for this review, but all share several important characteristics in common. First, all use methods that focus not on individuals but on relations between actors. These actors can be individuals,

groups, whole organizations, disciplines, or even organizational fields. Second, all the texts in this review situate their research in higher education institutions such as colleges and universities. Third, all the texts are empirical in nature, using data drawn from university stakeholders. A small number of the texts we include investigate ties among universities or between universities and other organizations.

Given these criteria, our approach to the literature search was quite natural. We began with a limited number of query phrases related to the two themes, higher education and social network analysis; we conducted a nested search through Google Scholar and relevant databases based on these. Having obtained an initial list of references, we then searched backward, to articles from their bibliographies, and forward, using Google Scholar's "cited by" feature to identify more recent articles referencing them. We completed several iterations of this procedure to yield the current list. Because this is an emergent field, we did not restrict our search to peer-reviewed journals. Thus, we have included books, papers delivered at conferences (which is the preferred means of disseminating scholarship in computer science and related fields), and a handful of high-quality working papers.

Although we chose to err on the side of inclusion, we did maintain a few boundaries we felt were important. Because we wanted to focus on colleges and universities as sites of higher education, we excluded articles examining networks of ideas or networks between journals. Moreover, while we touch on many related fields (informatics, scientometrics, social network analysis, etc.), our review cannot be exhaustive for each of them. For readers interested in these related fields, we can point to some useful reviews on university-industry partnerships (Oliver, 2008; Provan, Fish, & Sydow, 2007) and on bibliometric indicators (Borgman & Furner, 2002; Verbeek, Debackere, Luwel, & Zimmermann, 2002). Rather, we have attempted to concentrate on the literature within each field that most closely articulates with both the study of higher education and that of social networks.

We uncovered a set of 293 texts in 94 journals as well as other publication outlets. Figure 4.1 shows the distribution of these publications over time. The earliest handful appear in the late 1960s and 1970s. The count of publications per year increases steeply over the next decades, with the rate of growth leveling off by 2000 but continuing to increase at a steady rate until 2011–2012, when we conducted our search. Figure 4.2 shows the count of articles in each of the most popular journals represented in this chapter (i.e., all journals with two or more articles included). Of necessity, books and book chapters are excluded from this graph. Of the top nine outlets, four are journals of information science or science studies (*Scientometrics*, *Journal of the American Society for Information Science and Technology*, *Journal of Informetrics*, and *Social Studies of Science*), two are major sociology journals (*American Sociological Review* and *American Journal of Sociology*), and one is an SNA specialty journal (*Social Networks*).

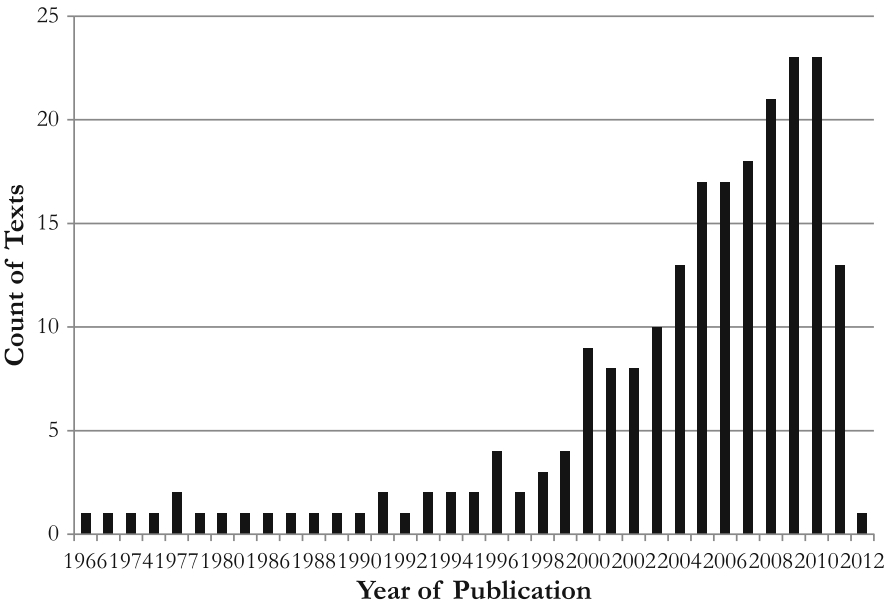


Fig. 4.1 Count of publications per year

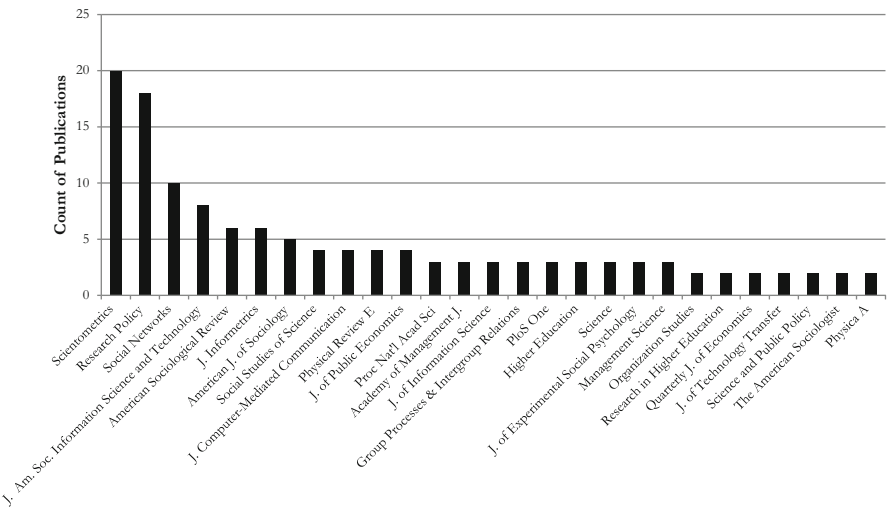


Fig. 4.2 Count of publications in each of the most common journals

An Analytical and Empirical Review

We study the literature on social networks in higher education via two routes. On the one hand, we approach the literature analytically and classify texts by the network properties discussed and the role social networks assume in the core research question.

This approach gives readers a sense of the constructs and questions scholars have focused upon in conducting social networks research in higher education. On the other hand, we approach the literature empirically and study the co-citation networks of these texts using social network analysis. This approach identifies clusters of works that draw on the same bodies of literature. In the final section of this chapter, we discuss how our analytical classification and empirically derived clusters interrelate. From their interrelation, we learn where social network scholars of higher education are conducting related but unrecognized work and where potentially useful cross-fertilization might occur in the future to forge a more developed and interrelated line of research.

Analytic Approach

First, we should define common terms and concepts from social network analysis (Wasserman & Faust, 1994). *Nodes* or *vertices* are the actors of a network population. Here, they are most often individuals (students or faculty members), but in theory nodes could be just about anyone or anything: from people, to organizations, to computers connected through the Internet, or even abstract concepts or words. Nodes are the units whose connections and relations are catalogued in the network. *Edges* or *ties* are the connections between nodes. Ties can be defined in a variety of ways: two students in a network may share a tie if they are friends or classmates, and two faculty members may share a tie if they have coauthored a paper together. Two universities may share a tie if one hires the graduates of the other. In our analysis later in the chapter, the nodes are the texts in this literature review, and the edges between them represent co-referencing. That is, two texts share a tie if they both cite the same reference.

We study the literature on social network analysis in higher education by considering, for each text, the *network population* they discuss, the *type of actor or unit of analysis* they focus upon, and the *role social networks play in their research questions*. These are not exhaustive analytic dimensions on which to study networks in higher education, but they help organize our understanding of the literature and the sorts of comparisons that can be made. When texts focus on the same units of analysis, study actors in similar roles, and use network explanations in the same way, they likely inform one another. When their findings are consistent and specific to the same analytic dimension, they reveal points of empirical consensus. When they disagree, they point to places where additional research is needed. When certain units of analysis, network populations, and explanations go unaddressed, they leave gaps where novel research can be performed.

Our first analytic dimension concerns the *network boundary definition*, or *network population*, that is the focus of analysis (Laumann, Marsden, & Prensky, 1983). Within our corpus, all works focus on faculty or student networks and very rarely consider the networks of university staff. In addition, they do not regard all the relationships occurring within a university setting where faculty, student, and staff interrelate. Therefore, we divide our discussion of the literature into two sections, one covering the student-focused literature and the other the faculty-focused.

Our second analytic dimension concerns *the primary social actors in each network and the unit of analysis at which they are described*. While the bulk of the literature takes individuals as the network vertices, we find a variety of other approaches: “actors” can also be papers in a citation network, universities or other organizations in an interorganizational network or consortium, countries engaged in international exchanges, and even disciplines, departments, or research areas.

The focal actors in a network often correspond to the unit of analysis in the research question; however, this is not always the case. For example, in studies of small groups, such as the set of authors on a paper or the set of collaborators on a project, the unit of analysis may be the group, while the network node is the individual author or collaborator. This design facilitates comparison across groups, allowing for investigation of the structural properties of the group, or the mix of attributes of group members. At the same time, the ties between groups are often not considered; rather the focus is on ties between members within the group.

Our third analytic dimension concerns *the role that the social network plays in the text’s research question*: are network structures or network properties conceptualized as a dependent variable or outcome? Are they treated as an independent variable or input condition, or is the research simply descriptive, without suggesting a causal relationship or association? Each type of question reflects a distinct type of research program in networks. The description of social network phenomena is highly useful to the field of higher education. Descriptions give us a sense of the social experience of higher education and the role networks play in these systems. They build ontological forms of knowledge that become the basis of ensuing predictive and causal forms of analysis. When we regard networks as a dependent variable, the research goal is to explain how a social structure of stable interaction patterns comes about. In this manner, we better learn how a university system functions and potentially can be altered. Finally, when networks are the independent variable, we learn how relationships affect persons and act as conduits for other social phenomena.

Within each section below, we consider the literature along these multiple dimensions of interest. Our analytical characterization of the literature is organized as follows: we begin with a discussion of the faculty literature, initially considering work that is primarily descriptive. We follow this by summarizing work that examines how networks are created—that is, work that uses the network as the dependent variable. Lastly, we then discuss the converse: work that uses the network as an explanatory variable. We organize each of these subsections by the unit that is taken as the network node. After our survey of the literature on university faculty, we apply the same outline to the student-focused literature. The breakdown of the literature into these analytical categories is summarized in Table 4.1.

Universities as Sites of Faculty Work

Research on faculty networks tends to concern knowledge production (authoring) and consumption (citation, co-citation, author co-citation). The majority of work in this section takes individual faculty members as the network node, but aggregate nodes

Table 4.1 Distribution of articles into analytical categories

Population	Network's role in research question	Node or Unit of Analysis			
		Individual	Team/ publication	University/ organization	Country
Faculty	Descriptive	51	12	3	0
	Dependent variable	34	4	5	0
	Independent variable	32	3	7	0
Students	Descriptive	8	0	0	2
	Dependent variable	20	0	0	0
	Independent variable	26	0	1	0

(either teams of coauthors/coinventors or whole organizations) are also represented. Inquiry is nearly evenly split between descriptive work, work taking the network as dependent variable, and that taking the network as an independent variable.

Descriptive Work

Descriptive work on the networks among individual faculty members provides several important types of insights: we learn about the structure of intellectual fields, how they compare, and what they share in common. We also learn about variation in rates of productivity and collaboration within each field. Early descriptive work focused on collegial ties among faculty, or the “invisible college” (Price & Beaver, 1966). Later work has focused more on patterns of knowledge creation and collaboration. As network techniques have advanced, researchers’ capacity to handle large networks has grown, heralding an era where analysis of larger knowledge consumption patterns is feasible.

Node: Individual

Much research in this area relies on one of two types of ties: coauthorship, in which two scholars are linked if they have ever coauthored a publication, and co-citation, in which two papers are linked if they are cited by the same, later paper. Work on coauthorship networks demonstrates that these networks are a reliable way to identify known research groups or specialties and that they often return similar patterns to those obtained from co-citation networks (Girvan & Newman, 2002; Logan & Shaw, 1991; Mählck & Persson, 2000; Otte & Rousseau, 2002; Perianes-Rodríguez, Olmeda-Gómez, & Moya-Anegón, 2010; Peters & VanRaaij, 1991).

One basic goal of descriptive network research is to map the shape or structure of intellectual fields. This is commonly accomplished through author co-citation analysis, a variation on co-citation analysis, in which two authors, rather than two papers, are linked when both are cited by a later paper. This technique has been especially popular in fields related to information science (Ding, Chowdhury, & Foo, 1999; Ellis, Allen, & Wilson, 1999; Hellsten, Lambiotte, Scharnhorst, & Ausloos, 2007; Karki, 1996). However, scholars have adopted a similar approach in a variety of fields, including

the biological sciences, management science and strategic management, innovation research, medical informatics, philosophy, learning styles research, entrepreneurship, and higher education (Andrews, 2003; Cottrill, Rogers, & Mills, 1989; Culnan, 1986, 1987; Desmedt & Valcke, 2004; Kreuzman, 2001; Mählck & Persson, 2000; Mullins, Hargens, Hecht, & Kick, 1977; Reader & Watkins 2006; Tight, 2007).

The majority of these studies collect data covering a span of a few years and analyzes them as a snapshot of the field in question. However, a handful of authors have taken a more longitudinal approach, dividing the data into two or three periods and examining changing patterns over time. For example, Nerur, Rasheed and Natarajan (2008) collected 21 years of data on faculty studying strategic management, analyzing this data as three time periods: they found changes in the factors identified between the first and second time period, but stability between the second and third. Using a similar approach, White and McCain (1998) find evidence of a paradigm shift in information science in the 1980s. Borner and colleagues develop weighted graph techniques in their study of the field of information visualization from 1974 to 2004 (Borner, Dall'Asta, Ke, & Vespignani, 2005). Beyond identifying key authors and research areas in this emergent field, they also demonstrate a shift from early on, when the field has relatively few high-impact authors, to the later period, when impact is spread out over a wider set of teams. Over this time, the main set of connected actors (the “main component”) grows, and the field becomes more interdisciplinary and globally connected.

The goals of coauthorship network analysis are often quite similar. In addition to mapping specialty areas, these studies may seek to quantify patterns of collaboration and productivity and to compare fields. One of the most common findings regarding academic collaboration networks is that they are “*small worlds*,” meaning they are both highly clustered and have short overall path lengths. Clustering occurs when small groups of researchers share many ties in common, while short path lengths indicate that there are a few long-range ties that connect individuals in distinct clusters. In such a structure, long-range ties can be instrumental in fostering diffusion of information, while the closeness of local clusters promotes innovation (Lambiotte & Panzarasa, 2009). Examples of this can be found in Newman’s work (2001a, 2001b, 2001c, 2004) where he identifies small-world networks among biomedical researchers in the Medline database, among physicists in the Los Alamos e-Print Archive, and among the NCSTRL computer science database, using coauthorship data. This finding has since been replicated in a variety of other settings, also relying on coauthorships: information science, the set of papers published in the journal *Scientometrics*, management science, Slovenian researchers in a variety of fields, French cancer researchers, international networks of collaborators in computer science, the study of digital libraries, and Italian statisticians (De Stefano, Vitale, & Zaccarin, 2010; Franceschet, 2011; Gossart & Özman, 2008; Hou, Kretschmer, & Liu, 2008; Liu, Bollen, Nelson, & Van de Sompel, 2005; Menezes, Ziviani, Laender, & Almeida, 2009; Otte & Rousseau, 2002; Perc, 2010; Uzzi, Amaral, & Reed-Tsochas, 2007).

In addition to being small worlds, academic coauthorship networks are often characterized by a *core-periphery structure*. Crane (1969) investigated the “invisible

colleges” among scholars—academic communities that span universities, connecting scholars through conversations and collaborations. She found that these networks were comprised of a productive, well-connected core, surrounded by a less notable periphery, and that members of a research area tend to be connected to each other through these highly active, central researchers. Newman (2001a, 2004) identifies the same pattern in coauthor networks in biology, physics, and math; the distributions of ties in these networks are greatly skewed, with most individuals having only one or a few coauthors and a few having hundreds or even thousands. Further, he finds that on average, 64% of the shortest paths from one individual to others in the network pass through the individual’s best-connected collaborator; most of the remainder pass through his second-best-connected collaborator, a phenomenon known as “funneling” (Newman, 2001c). Others have identified similar patterns in sociology, chemistry, chemical engineering, biotechnology, information science, and other physics networks (Durbach, Naidoo, & Mouton, 2008; Moody, 2004; Kronegger, Ferligoj, & Doreian, 2011; Peters & VanRaen, 1991; Tomassini, Luthi, Giacobini, & Langdon, 2006; Xu & Chau, 2006). The skew in the number of coauthors in the mathematics network led to the creation of the “Erdos number”: the number of steps away in the coauthorship network an author is from the highly productive and collaborative mathematician Paul Erdos. While some take a low Erdos number as an indicator of status, comparing Erdos numbers is mainly a parlor game; however, the fact that one scholar can act as the lynchpin for a large academic community provides a powerful illustration of Newman’s funneling argument. Legal scholars have mimicked the concept, arguing that Cass Sunstein should be considered “the legal Erdos” (Edelman & George, 2007).

Core-periphery structures are not merely an artifact of network illustrations. Breiger (1976) showed that the core-periphery structure of a biomedical research network dictates researchers’ awareness of their colleagues: everyone is aware of the “top” strata of researchers, while they appear less cognizant of those outside their circle. The second strata’s members are aware of each other, and of the top, but not of the less central researchers, and so on. Thus, researchers at the core are those most visible to the network; those at the periphery direct their attention inward to the center of the network.

Descriptive studies in a variety of fields have sought to quantify collaboration patterns and to make comparisons between disciplines. The average number of authors per paper varies across disciplines: in biomedical research and computer science, it falls between 3 and 6; for high-energy physics, it is 11; among physics educators, it is 1.7 (Newman, 2001a, 2003; Yeung, Liu, & Ng, 2005; Tomassini et al., 2006). Newman finds that, in general, experimental fields show higher average coauthorship than theoretical fields—a pattern consistent with the findings of other scholars; we discuss this finding in the section on network as dependent variable. Rates of solo authoring also vary: Hou, et al. (2008) find that, among all papers published in the journal *Scientometrics* from 1978 to 2004, solo-authored papers are more common than coauthored papers; Liu, et al. (2005) find the reverse is true in the digital libraries field. Similarly, Yeung, et al. (2005) find that 30% of authors publishing on physics education have zero collaborators.

While much research indicates that academic collaboration networks are very well connected, some researchers have found fragmentation and disconnectedness. For example, a study of Brazilian researchers working on seven tropical diseases reveals a highly fragmented network, in which researchers may not be aware of others doing relevant work (Morel, Serruya, Penna, & Guimarães, 2009). Menezes, et al. (2009) find that, in contrast to its American and Brazilian counterparts, the European computer science collaboration network is much more fragmented, comprising isolated research groups. In the field of genetic programming, the main component captures only 35% of the membership (Tomassini et al., 2006). Friedkin (1978) provides one potential explanation for the appearance of fragmentation: examining ties within one university, across many disciplines, he finds that the sub-disciplinary specialty area, rather than the disciplinary department, is the most important and consistent unit structuring collaborations. Another possible explanation hinges on researchers' tendency to share or to guard discoveries: Balconi, Breschi, and Lissoni (2004) find that networks of Italian inventors working with proprietary technology are highly fragmented, while academic inventors tend to be better connected and to exchange information more freely.

Finally, researchers studying related topics may orient toward different geographical audiences. Gossart and Özman (2008) demonstrate that Turkish research in the social sciences and humanities appears to be split into two disparate populations: those who publish in international journals and those who publish in Turkish journals; there appears to be little overlap or mutual awareness between the two.

Node: Paper, Team, or Research Group

Overwhelmingly, the literature on networks in higher education relies on an understanding of individuals, rather than groups or organizations, as network nodes. A small body of work considers alternatives to this perspective, conceptualizing network actors as the set of coauthors on a paper, a small project team, or a research lab. While this approach remains little used to date, it presents rich possibilities. Labs are the fundamental social unit organizing research in the natural and physical sciences today. Labs are made up of individuals, and there is much of interest to be learned in studying the interactions among these individuals. However, labs also interact with other labs and, in doing so, function as integral social units. Remarkably little work has investigated labs as social units; such research presents a compelling opportunity (Lazega, Jourda, Mounier, & Stofer, 2008). More common is work that considers publications (and implicitly or explicitly their sets of authors) as network nodes and examines patterns of co-citation among them. Whereas in author citation analysis the links are between authors who cite each other, in the co-citation approach, the links arise between papers that share the same references.

Scholarship in this area yields findings analogous to research on individual actors: we learn about the shapes and structures that characterize fields and about how these may evolve over time. We see comparisons among fields and also learn about how fields may articulate with one another.

One of the leading pioneers of this research strategy was Henry G. Small, who worked for the Institute for Scientific Information (ISI) and who developed techniques still in use today. His 1974 article with Belver C. Griffith, “The Structure of Scientific Literatures I: Identifying and Graphing Specialties,” is exemplary (Small & Griffith 1974). The authors began with all articles published in the Science Citation Index in the first quarter of 1972 and selected all references cited ten times or more during the quarter. They tabulated the number of times each pair of highly cited articles was cited by the same paper and treated these as links between the papers. They empirically demonstrated the existence of integrated research specialties with a high degree of internal linkage and showed conversely that nearly the complete population of documents was linked, albeit tenuously, at a low level of co-citation—both important findings for our understanding of how information flows within and between research specialties.

Later, Small developed techniques to study co-citation longitudinally (Small, 1977) and catalogued shifts in one specialty (collagen research) over 5 years. He followed up with a survey of researchers in the field to determine whether the co-citation clusters he identified matched researchers’ perceptions. He concluded that the clusters were valid and that the field appeared to have undergone a transition in its main focus over the study period.

Scholars today use techniques very similar to those developed by Small and his collaborators. For example, Saka and Igami (2007) use essentially the same approach to identify and visualize “hot” areas of research in science. Hargens (2000) finds that fields vary in patterns of citation to foundational work versus to more recent publications. Other researchers use a longitudinal approach, dividing their data into a few time periods to study shifts in a field over time. In a study of entrepreneurship research from 1980 to 2004, Gregoire, Noel, Dery, and Bechard (2006) use this approach to identify an emergent subfield: strategy research. Oliver and Ebers (1998) and Pilkington and Meredith (2008) conduct similar work on organization studies and operations research, respectively. Collectively, this line of work yields insights about the evolution of research areas and about variation in the shapes of different fields.

The bulk of scholarship using papers or research teams as network nodes also relies on co-citation analysis. Many of the same patterns observed in networks of individuals in the prior section have also been identified in citation networks among papers, including *small-world networks* and *core-periphery structures*. Wallace, Larivière, and Gingras (2012) find a small-world citation network in eight different disciplines in ISI Web of Knowledge. Jo, Jeung, Park, and Yoon (2009) identify a small-world network in the citation network. Human Resources research. Carolan (2008) uses not a citation network but a co-reader network, in which two papers in a database are linked if they have been downloaded by the same reader; he identifies a similar pattern among educational research papers. He further finds that this network has a core-periphery structure, with a small number of articles responsible not only for the community’s internal density but also for its connections to other specialty areas. Rather than co-citation analysis, Smeaton et al. (2002) use content analysis. In this approach, the authors cluster papers based on the weighted

similarity of words used in the title, abstract, and author fields. They apply this method to a set of papers from the special interest group on information retrieval at a computer science conference, gaining insights about the structure of scholarship in this field.

Murray (2002) takes as her unit of analysis the patent-paper pair—that is, the patent and the paper that, together, publish the same discovery or invention. She examines the network of patent citations and that of publication citations and finds that the two are separate; however, interviews with inventors reveal that while the two networks do not explicitly cite each other, information does flow between them. Also using the paper-patent pair, Ducor (2000) finds that although the criteria for inclusion as coauthor on a paper and as a co-inventor on a patent are similar, the average number of authors on a scientific article is significantly higher than the number of inventors on the corresponding patent. He argues that this finding can be taken as evidence of “gift” authorships, or of the exclusion from patents of rightful inventors, or both.

Lazega, et al. (2008) provide the only article we have found using the research lab as the network node. They find that, in predicting the impact of a lab’s production, its size and the number of ties members hold to others outside the lab seem to matter more than the researchers’ prestige, social resources, or individual number of prior publications. They further find that the network of labs engaged in cancer research in France is a small-world network and is highly stratified, with roughly 30 people controlling the circulation of resources in the interindividual and interorganizational network.

Node: Organization or Discipline

Finally, a small body of literature considers networks comprised of organizations and disciplines; this corpus is not nearly as well developed as those focusing on individuals or on publication teams. This research echoes phenomena discussed above, but patterns here have generally been identified in only one setting, rather than repeated across settings.

Luukkonen, Persson and Sivertsen (1992) show that international, interinstitutional collaboration increased through the 1970s and 1980s. Miquel and Okubo (1994) use data from the ISI Science Citation Index, including 98 countries and 8 major disciplinary areas, describing in detail which countries are most active in each field; they argue that such analysis offers a useful tool in the analysis of national science policies.

In a clever analysis of the market for recent Ph.D. graduates in the United States, Han (2003) links two universities when one of them hires the other’s graduates. By examining the positions universities occupy within the network structure, Han shows that universities fall into three stratified classes: class 1 only hired from within, class 2 hires from class 1, and class 3 hires from classes 1 and 2. That is, mobility for recent Ph.D. graduates flows only one way: from more elite to less elite institutions.

Across levels of analysis, descriptive research on faculty demonstrates an interest in characterizing the structures and shapes of social networks among researchers,

teams, and organizations. At all three levels, we find evidence of similar patterns, including core-periphery structures and small-world networks. These patterns hold for both knowledge production, through collaborations, and knowledge consumption, through reading and citation. Together, they portray a world in which a handful of active scientists, or of widely read papers, accomplish much of the work connecting others. Since these network structures are identified in many fields, it suggests there is a fundamental social process at work that shapes how faculty and knowledge creation are organized.

Networks as Dependent Variable

When texts focus on networks as a dependent variable, they attempt to predict and explain the formation of social structures in higher education contexts. These social structures generally reflect stable patterns of interaction associated with close friendships, repeated collaborations, or research communities. The bulk of the literature that conceptualizes network structure as a dependent variable investigates the forces shaping networks and promoting the formation of new ties: do we choose collaborators and friends like ourselves? Those who are located near to us, socially or geographically? Do we choose friends of friends or seek to befriend the most popular or most productive? These forces are not mutually exclusive and in fact can reinforce each other. In what follows, we relate how studies of faculty network formation focus on different units of analysis.

Node: Individual

Most studies predicting faculty networks focus on individuals as the network actors, and many focus specifically on the ties individuals form in coauthoring and otherwise collaborating on research. There is little doubt that a temporal trend exists, that coauthored papers as a percent of all publications have increased significantly in the last half century, and that the average number of authors per paper has increased as well (Acedo, Barroso, Casanueva, & Galán, 2006; Adams, Black, Clemmons, & Stephan, 2005; Babchuk, Keith & Peters, 1999; Glänzel, 2002; Glänzel & Schubert, 2005; Kronegger et al., 2011; Menezes et al., 2009). Rates of coauthorship are highest in the natural sciences and engineering but have also increased in the social sciences; in contrast, rates of collaboration in the humanities have remained fairly flat (Lariviere, Gingras, & Archambault, 2006; Leydesdorff & Wagner, 2008; Wagner & Leydesdorff, 2005; Wuchty, Jones, & Uzzi, 2007). Not only teams in general but multi-university teams and international teams have increased markedly, particularly in the natural sciences, engineering, and the social sciences (Jones, Wuchty, & Uzzi, 2008; Laband & Tollison, 2000; Lorigo & Pellacini, 2007; Melin & Persson, 1996). A variety of rationales can motivate these collaborations (Melin, 2000). Although this trend is widespread, it is not universal: interinstitutional collaboration in Korea, as reflected in the ISI Science Citation Index, appears to have decreased from the 1970s to the 1990s (Park & Leydesdorff, 2010).

We can be confident that scholars work together more frequently on research; but with whom are they choosing to collaborate? Here, many traditional tie-formation mechanisms apply from mainstream social networks research. One such mechanism is *homophily*, or the tendency for people to prefer ties with others who share their personal traits—the “birds of a feather flock together” phenomenon (McPherson, Smith-Lovin, & Cook, 2001). There is evidence that in interuniversity teams, faculty are more likely to collaborate with others from universities of similar prestige (Evans, Lambiotte, & Panzarasa, 2011) and that they collaborate more with individuals who have done similar prior work (Ding, 2011; Mullins, 1968) and who have commensurate levels of expertise (Taramasco, Cointet, & Roth, 2010). However, Crane (1969) finds that members of a research area identify many contacts from outside their area, though they may not coauthor with them.

The evidence on the role of gender homophily among faculty is mixed. McDowell and Smith (1992) and Kim (2009) find that researchers are more likely to collaborate with others of the same gender, while Bozeman and Corley (2004) find no evidence of preference for same-gender collaborators, and Hunter and Leahey (2008) demonstrate an increase in cross sex collaboration since 1930. Each of these studies has limitations: Hunter and Leahey’s data covers only sociologists (mostly American), while Kim’s covers only Korean sociologists, and McDowell and Smith’s includes only economists from top institutions. Bozeman and Corley collected CVs from 500 NSF-funded scientists; while their data span multiple fields, their sample is too small to be definitive, is arguably biased toward elite researchers, and is subject to the effects of scholars selecting what to report on a CV. Further research will be necessary to better illuminate the dynamics of gender-based homophily in collaboration.

The record is similarly mixed for the role of tenure or employment status (Bozeman & Corley, 2004; Kim, 2009; Pepe & Rodriguez, 2010; Rodriguez & Pepe, 2008). Hence, evidence is mixed on attribute homophily and suggests a waning of relevance over time. Dahlander and McFarland (2013) find that both homophily and proximity play roles in the choice to coauthor a paper and to co-apply for a grant. Moreover, they find that homophily is a strong predictor of a first tie and a comparatively weak predictor of a repeated tie, suggesting that as collaborators know each other better, they make choices to work together or not based on more than relatively superficial, homophilous traits.

Proximity—which can describe geographical or social nearness and is often referred to as “*propinquity*” in the SNA literature—is another fundamental mechanism of tie formation. Investigating the role of propinquity, some find that coauthorships are more likely among researchers at the same institution (Evans et al., 2011; Pepe & Rodriguez, 2010). Both in the natural sciences and in the social sciences and humanities, scholars are more likely to form collaborations with others located nearby and who speak the same language (Lariviere et al., 2006; Melin & Persson, 1996). Among those with ties to industry, geographic proximity can influence scientists’ decisions to find biotech companies (Audretsch & Stephan, 1996). However, propinquity does not always have the expected effects: Mullins (1968) finds that scholars are equally likely to name important contacts from other universities as

from their own, and Hunter and Leahey (2008) find the salience of propinquity has been decreasing since the 1950s for sociology. In general, then, prior work finds propinquity generates faculty relations, but there are some exceptions.

The effect of *triadic closure* has been studied as well. Here, the argument is that two people who share a friend in common will eventually befriend one another over time and close the cycle (the triad) in association: the “friend of a friend” effect. This is also known as *transitivity*, following the *transitive property* in mathematics. Friedkin (1980), Newman (2001b, 2001d), and van der Leij and Goyal (2011) all show that professors are more likely to form a new collaboration with faculty they already share a collaborator with and, moreover, that the strength of transitivity increases with the strength of the ties between the original collaborators. As such, there is a clear and consistent tendency for faculty to form transitive collaboration patterns.

Another key factor driving the observed shape of collaboration networks is *preferential attachment*, or the tendency for those who already have many ties to form new ties at a greater rate than those with fewer ties (the “rich get richer” phenomenon). Preferential attachment has been investigated in many collaboration networks: biomedicine, physics, computer science, sociology, nanoscience, Italian and Slovenian researchers across many fields, mathematics, neuroscience, genetic programming, sales management researchers, zebrafish researchers, and in a sample of the Science Citation Index (Barabasi et al., 2002; Kim, 2009; Newman, 2001c; Perc, 2010; Ramasco, Dorogovtsev, & Pastor-Satorras, 2004; Roth & Cointet, 2010; Tomassini & Luthi, 2007; Wagner & Leydesdorff, 2005; Yang, Jaramillo, & Chonko, 2009). In almost all of these cases, evidence for preferential attachment is observed. The two exceptions are studies of Italian academics in several disciplines (De Stefano et al., 2010; De Stefano, Giordano, & Vitale, 2011). There the authors find no support for preferential attachment, but their samples are much smaller than many of the others surveyed here (200–800 scientists each, as compared to hundreds of thousands or millions in many of the other articles), and this may explain the lack of a significant finding. In particular, in a smaller sample, individuals are limited in the number of ties they can possibly hold within the network, so preferential attachments are limited as well. In a study of 300,000 articles in nanoscience, Milojevic (2010) finds that preferential attachment only holds among authors with twenty or more collaborators, but not among those with fewer collaborators. Given the extremely large team sizes characterizing some of the fields investigated, it may be informative to separate populations of authors along these lines in future studies.

Similar to preferential attachment, there is some evidence for assortative mixing—that is, researchers are more likely to form ties with peers who engage in similar numbers of collaborations to their own (Menezes et al., 2009). However, this finding may not hold for the most highly cited authors, who appear unlikely to collaborate with each other (Ding, 2011). Ramasco, et al. (2004) attribute assortative mixing to aging of the population: researchers may choose collaborators of a similar career stage; as both collaborators age, they will tend to accumulate more ties to others, and this process may generate the observed patterns. Aging may influence the propensity to form ties in other ways as well: for example, older scientists appear

more likely than their younger peers to form ties with biotechnology firms outside their local region (Audretsch & Stephan, 1996).

Other research on factors that affect faculty network formation considers environmental or contextual factors: these are factors outside the network that can promote or discourage new tie formation within it. Increased availability of grant funding increases the number of collaborators on teams (Bozeman & Corley, 2004; Laband & Tollison, 2000). This effect holds for both federal funding and private, university-based funding (Adams et al., 2005). A study of Japanese government programs to promote research and development indicates that government sponsorship can influence the type of collaborations formed (Hayashi, 2003). Early improvements in communication technology, such as BITNET and DNS in the 1970s and 1980s, also increased collaborations, presumably by lowering barriers to communication over distances (Agrawal & Goldfarb, 2006); these advances appear to benefit women and those at nonelite institutions disproportionately (Ding, Levin, Stephan, & Winkler, 2010). Finally, in a qualitative study, Kezar (2005) describes a three-stage model for promoting collaborations within a university and increasing their chances of success. She finds the single most important factor is the existence of strong relationships within the campus community; these can develop informally but yield the most value when they are also formally encouraged, as through town meetings and retreats.

Personal characteristics can help determine one's propensity to form new ties as well, but the findings here are uncertain. Johri, Ramage, McFarland, and Jurafsky (2011) find that gender does not influence the type of collaborations one tends to engage in, while Laband and Tollison (2000) find that, among economists, female scholars are less likely than males to engage in long-distance collaborations. Hunter and Leahey (2008) find that, among sociologists, female-only teams are as prevalent as male-only teams, despite the much greater number of men in the field than women, suggesting some gender-based difference in team-formation patterns. Further, they also find that the institutional prestige of coauthors is typically higher than that of solo authors.

Epistemological characteristics of the research field can influence tie formation as well. Moody (2004) demonstrates that in sociology, degree varies with research specialty: those in quantitative subfields are more likely to collaborate than those in qualitative subfields. This finding is confirmed by others (Acedo et al., 2006; Hunter & Leahey, 2008; Lariviere et al., 2006).

Node: Paper, Team, Research Group, or Organization

As in the descriptive literature, the vast majority of research using network structure as the dependent variable conceptualizes individuals as network nodes. The intellectual territory in which small groups, paper teams, or organizations are treated as nodes remains much sparser, and we believe, under-explored. In an exception to this rule, Sorenson and Fleming (2004) consider how a node's position in one network can determine its position in a related network. Specifically, they consider the network of citations among patents, and they find that patents that reference published material receive more citations, earlier, and from more socially and geographically

distant inventors, lending support to the argument that publication accelerates the flow of information. In a fascinating study of the formation of consensus in scientific fields, Shwed and Bearman (2010) demonstrate that consensus is reflected in the network structure. As consensus forms, internal divisions in the citation network attenuate; where there had been multiple camps, each with particular citing patterns, there develops a single, larger field.

Usdiken and Pasadeos (1995) use co-citation analysis of papers in the organization studies field to show differences in orientation between papers written by American authors and those written by European authors. The two sets of papers formed largely separate citation networks, reflecting a divergence in conceptual perspectives in the two communities. Similarly, Ramlogan, Mina, Tampubolon, and Metcalfe (2007) find a US/Europe polarization in one of the two fields they study, interventional cardiology, but a much weaker divide in the other field, glaucoma, concluding that innovation is a complex process, unfolding unevenly in time and space.

In a study of an interorganizational network, Luukkonen, Tijssen, Persson, and Sivertsen (1993) find that the less developed the scientific infrastructure of a country, the more likely universities in that country are to engage in international collaborations. Fontana, Geuna, and Matt (2006) find that the firms most likely to form collaborative ties with universities are larger firms, those heavily engaged with R&D activities, and those that are more open to their environments. Löfsten and Lindelöf (2002, 2004) find that new technology-based firms are more likely to form ties with universities when they join science parks. Thune (2007) finds that university-industry collaborations are more likely to form and to be perceived as successful by participants, when there are prior established ties between the participants.

From the body of research studying faculty social networks as a dependent variable, we learn that several important mechanisms of tie formation operate at the individual and team levels: ties are shaped by the propinquity of the two people or teams and in some cases by their homophily. There is an accumulative effect for those who already hold many ties, and transitivity matters, with people likely to form new ties to those two steps away. Together, these factors drive field differentiation and generate international distinctions in faculty and citation networks. We learn that the social structure of faculty is characterized primarily through knowledge production and consumption—author collaborations and citation—and that they form by contextual and network mechanisms.

At the higher level of analysis, we learn that citation networks reflect the flow of information and the development of consensus. They can highlight divisions across disciplines or international settings and illustrate the important role context plays in shaping ties.

Networks as Independent Variable

When texts focus on networks as an independent variable, they attempt to illustrate how relationships influence important outcomes in higher education. Network effects can arise from a (dis)advantaged network position or local network milieu

that draws resources to an actor. Network effects can also be described at the dyadic level where relations act as pipes and channels through which influence and goods pass, often called *peer influence* or *diffusion*.

Node: Individual

At the individual level, a great deal of scholarship demonstrates how an actor's network properties influence outcomes. On faculty networks, scholars have devoted the most energy to the twin questions of how team size and team diversity among authors affect the impact of a published paper or patent. Researchers have also investigated how a scholar's peers can promote productivity and can even shape the content of one's research.

In general, there is strong consensus in the literature that coauthoring increases the impact of articles and the productivity of authors (Glänzel, 2002; Glänzel & Schubert, 2005; Wuchty et al., 2007). Acedo, et al. (2006) find that, in general, coauthored papers are longer and that higher-impact journals are characterized by a higher percentage of coauthored papers than lower-impact journals. In very early work on collaboration and productivity, Price and de Beaver (1966) found a correlation between an author's tendency to collaborate and his or her productivity. They conclude that there is a core of extremely active researchers surrounded by a large periphery of authors who collaborate with them in one or two multiple-authorship papers and then disappear.

Haslam and Laham (2009) find that scholars with a high proportion of coauthored papers over their careers tend to publish more over their careers and tend to have a higher average journal impact factor and higher overall impact (measured as total citations, h-index, and most-cited article). He (2009), too, finds evidence that researchers with more collaborators, and those with higher network centrality, are more productive. However, the relationship they identify is not monotonic: publication quantity and impact are maximized at intermediate levels of coauthorship. Similarly, McFadyen and colleagues find an inverted U-shaped curve between the number of collaborators and total knowledge creation (measured as the sum of impact-factor-weighted articles per year) (McFadyen & Cannella, 2004; McFadyen, Semadeni, & Cannella, 2009). Because it is costly, in terms of time and effort, to maintain a dense network of contacts, it pays to be strategic in choosing ties: McFadyen, et al. (2009) show that maintaining ties to a sparse network of colleagues (who are not connected to each other) leads to the greatest productivity and output. Among journals, the average number of authors per paper appears to increase with the prestige of the journal (Madlberger & Roztocki, 2009).

Glänzel (2002) finds that in biomedicine, authors who average a team size of six are the most productive; in chemistry, the most productive team size appears to be three, and in math it is one to two. In computer science, Franceschet (2011) finds that two or at most three authors are the optimal size but that conference papers tend to have more authors than journal papers. In a somewhat unusual study, Sigelman (2009), who had access to the internal accept/reject decisions of a political science journal,

found no difference in acceptance rates for single- versus multiauthored papers. Guimerà, Uzzi, Spiro, and Amaral (2005), examining the proportions of newcomers versus experienced authors on a team of coauthors, find that successful teams have a higher fraction of experienced authors than average. When experienced authors collaborate with newcomers, the success of the resulting paper does not depend on the senior author's prior expertise in the topic (Johri et al., 2011). Not only do the most productive authors collaborate, but (perhaps as a result) within the network structure, they tend to be located in large clusters and to have short overall path lengths to others in the network (Kretschmer, 2004). In a study of information science, Yan and Ding (2009) find that authors' centrality significantly correlates with the impact of their papers.

Heinze and Bauer (2007) compare two groups of highly productive authors; first, they selected a sample of highly creative authors, those who had received prestigious science awards and nominations by an international peer group. They compare these to a second group of equally productive authors in order to investigate what sets the creative scientists apart. They find that the creative scientists have larger coauthor networks than the reference group and that their work spans a wider range of academic disciplines, as reflected by the journals in which they publish. Network *brokerage*—being located at a position that spans two otherwise disconnected groups—also appears to play a role; creative scientists had higher brokerage scores than the reference group, and scientists in broker positions received more citations over their careers than others.

While the consensus on coauthored papers is clear, the role of geographic distance in predicting impact is less clear. There is support for the argument that papers whose authors span university or national boundaries tend to have higher impact: Jones, et al. (2008) find that papers with the highest impact are those authored by teams that span multiple universities, in which at least one is a top-tier university. Katz and Hicks (1997) find that while collaborating with an author from one's own institution or another institution in the same country increases the average impact, collaborating with an author from a foreign institution increases the impact about twice as much. However, Cummings and Kiesler (2008) find that geographically dispersed teams face unique tensions and communication challenges but that prior experience working together can moderate these negative effects. Evidence from a carefully constructed, hand-verified dataset on researchers from New Zealand indicates that both local and international collaborations increase a paper's impact but that there is not a significant difference between the two types of collaboration (He, 2009). In a unique study of multiple campuses within one university, Lee, Brownstein, Mills, and Kohane (2010) show that on the microscale, geographic proximity between the first and last author predicts impact. While this finding does not directly contradict conclusions regarding international collaboration, it does lend credence to the argument that proximity of collaborators is associated with better communication between them and can lead to higher quality work. Jones, et al. (2008) further find that the increase in multi-university collaboration coincides with increasing social stratification in the coauthorship network: those from top universities are increasingly more likely to choose collaborators from other top universities; this practice may concentrate

the production of scientific knowledge in fewer, rather than more, centers of high-impact science.

An important lurking variable in the literature on how team size and geographic dispersal affect knowledge production is the role played by communication: large, diverse, and dispersed teams face considerable obstacles to communication. Confirming this intuition, Ebadi and Utterback (1984) investigated directly the communication style and centralization of collaborative research teams. They find that the frequency, centrality, and diversity of communication all have positive effects on the success of knowledge creation, with frequency playing the most important role. Conversely, high formality of communication dampened innovation.

In other work using network structure as an independent variable, Johnson and Oppenheim (2007) examine the interaction between a personal, face-to-face network and a citation network. Using a small sample consisting of the personal and citation networks surrounding three focal researchers, they conclude that researchers in their sample are more likely to cite others they know personally. Wallace, et al. (2012) conduct a similar investigation. They use a much larger dataset, the ISI Web of Science, covering 50 years of publications; however, they lack the direct reports of researchers' contact networks that Johnson and Oppenheim obtained. Rather, Wallace, et al. defined contacts as coauthors and asked whether authors were likely to cite those with whom they had previously coauthored. They find that, across fields, once self-citations are excluded, there is little tendency to cite one's coauthors preferentially. To the extent that scholars choose collaborators from different research areas, whose skills are complimentary to their own, it is not surprising that they would be unlikely to cite these colleagues on research outside of the collaboration. At the same time, researchers may indeed hold a preference for citing work of those within their own specialty whom they know personally. Perhaps contrarily to this speculation, Leahey and Reikowsky (2008) find that the "complementary specialist" style of collaboration represents only 11% of collaborations in a sample of sociological journals, while the pattern of generalists collaborating with generalists was much more common (70% of the total). Further research will be necessary to elucidate whether these proportions hold across fields and how they may interact with citation habits.

The literature on *peer influence* also tackles the question of how network factors can shape outcomes of interest. Studies on "superstar extinction" examine how the sudden, exogenous removal of a member of the network affects her collaborators. This approach allows us to infer how a highly productive scholar influences her peers. Results indicate that collaborating with a superstar does boost a scholar's quality-adjusted production; however, the effect seems localized to coauthors; the influence does not appear to spread to the star's whole department (Azoulay, Graff Zivin, & Wang, 2010; Waldinger, 2009). Oettl (2009) finds that helpful peers (measured through mentions in others' acknowledgements) can boost peers' productivity without themselves being highly productive. Rawlings and McFarland (2011) show that influence extends beyond publication patterns to grants: peers in authority positions are most likely to be influential, as are those with strong ties to the focal person; men appear to be more susceptible to peer influence than are women.

Influence can take other forms besides boosting or hampering productivity. Leahey (2006) demonstrates that advisors transfer their views of research practices (such as how to handle anomalous data and appropriate use of statistical significance testing) to their advisees. Further, faculty members' adoption of new technological practices can be influenced by their peers; in this case, social proximity matters but spatial proximity on campus appears not to (Durrington, Repman, & Valente, 2000).

Evans (2010a, 2010b) shows that ties to industry influence scientists' behavior: they become more exploratory in their research (especially scientists who are centrally located in the network), and they are more likely to limit how much they share their discoveries. In contrast, ties to government promote the sharing of discoveries. Balconi, et al. (2004) find that in Italy, academic inventors also tend to be more centrally connected than nonacademics. Gulbrandsen and Smeby (2005) find that professors with industry funding are more likely to describe their research as "applied," that they collaborate more with researchers both in academia and in industry, and that they report more scientific publications.

Meanwhile, Clark (2010) finds that among university scientists, collaborating with industry does not appear to stifle interuniversity collaborations but rather appears to promote them. Scientists bring to these collaborations not only their expertise and skills but also a rich network that proves an asset to firms with whom they collaborate (Murray, 2004). Lee (2000) finds that firms in university-industry partnerships benefit from increased access to university-based discoveries, while faculty members enjoy stable funding and access to equipment.

Node: Paper, Team, or Research Group

Considering a unit of analysis other than the individual as the network node remains rare. This is true for studies of faculty networks as a dependent variable, and it is true for studies of faculty networks as an independent variable. There are only a few exceptions. Jo, et al. (2009) find that the content of a paper largely determines its location in the citation network: position is highly correlated with the topics and nature of the text. Similarly, Shi, Adamic, Tseng, and Clarkson (2009) consider the question of how a publication's citation patterns relate to its subsequent impact. They find that, in the natural sciences, papers that draw on research outside their own specialty tend to be cited slightly more than papers that only cite within their specialty. However, they observe the opposite in the social sciences: citing only within specialty predicts higher impact.

In an interesting study of the effect of collaboration on research quality, Rigby and Edler (2005) collect data on 22 government-funded research projects in Austria, measuring the level of collaboration among subprojects on each of these funded networks. Their research design and data source are compelling; few others have compared across networks, so this is a rare study of variation in network properties. However, their outcome measure was puzzling: they measure research quality as the ratio between the number of citations a published paper receives and the average number of citations received by the papers in the journal in which it was published.

Thus, if paper A is published in an out-of-the-way journal, whose average number of citations per paper is 0.5, and paper A receives 1 citation, its ratio will be 2. If paper B is published in a prestigious journal, whose average number of citations per paper is 100, and paper B received 100 citations, its ratio will be 1. By this measure, paper A will be ranked as much higher quality than paper B, even though B is published in a higher-impact journal and receives many more citations.

Using this measure of research quality, Rigby and Edler (2005) find that highly collaborative research networks have low variability in the quality of their research output and that this output tends to be of below-median quality. Networks with lower collaboration show much higher variability in research output, with some papers well above median quality and some well below. Given the unintuitive measure of research quality, it is difficult to generalize from their findings; however, their research design is innovative and bears repeating.

Node: Organization

The small literature using organizations as network actors investigates a variety of questions regarding the exchange of Ph.D. graduates between universities, connections between universities in consortia, and ties between universities and industry. Burris (2004) examines the network of Ph.D. exchange between university departments, in which one department hires the graduates of another; his focus is on American sociology departments, but he includes data on history and political science departments as well. He finds that departments that are more central in this exchange network are better at placing graduates in high-prestige positions, even controlling for the graduates' publication records. Hadani, Coombes, Das, and Jalajas (2011) corroborate this finding with data from the management field and also show that departmental centrality does not explain graduates' success in publishing early in their careers.

Kraatz (1998) considers consortia of universities and finds that smaller, more homogeneous, and older consortia appear to offer the most utility to universities seeking to mitigate uncertainty through imitation. Moreover, universities are more likely to imitate others most similar to themselves, rather than imitating the highest status or most visible universities in the network. Metcalfe (2006) analyzes the benefits to technology corporations and education associations of corporate sponsorship of the organizations. She finds that corporations benefit from their proximity to a respected nonprofit brand, while the education associations benefit from signaling that they are innovative and market relevant.

Scholars of innovation, management, and entrepreneurship have made extensive study of interfirm and university-industry ties and the role that such ties play in knowledge-intensive industries. While much of this literature does not explicitly address questions related to higher education, there are important points of articulation. In one of the landmark papers in this area, Powell, Koput, and Smith-Doerr (1996) argue that in fields of rapid technological development, such as biotechnology, the ability to innovate resides within networks of interorganizational relationships,

rather than within individual firms; in particular, the ability to collaborate with university scientists, both formally and informally, provides firms with additional absorptive capacity, making them better at learning from their surroundings. Owen-Smith and Powell (2003) further show that universities are most successful at producing high-impact patents when they hold an intermediate number of ties to a commercial network: either too many or too few connections can hamper innovation. Later work has confirmed that university-industry ties promote regions of innovation (Looy, Debackere, & Andries, 2003; Marques, Caraça, & Diz, 2006).

The literature using networks as an independent variable tells us several interesting things. The evidence suggests that coauthorship increases a paper's impact and an author's productivity. While collaboration is increasing across fields, the "optimal" team size varies among fields and is generally larger in biology and medicine than in the physical sciences or math. The effects of geographical dispersion on team success appear mixed, but it is clear that good communication among team members is vital. The literature on peer effects demonstrates that scholars transfer ideas and habits to their collaborators and students and can even boost one another's productivity. Ties to industry can influence the types of questions researchers pursue. For universities, ties to other organizations can help mitigate uncertainty and increase the university's ability to learn through collaboration.

Faculty Network Summary

In sum, research on faculty networks in higher education has addressed a variety of research questions. The shape of faculty networks has been well described: they often take the form of a core-periphery network, with a tight cluster of well-connected researchers or papers at the center, and successive rings of the less well connected surrounding it. This shape characterized both the networks of individual faculty members and the networks of teams or publications; it appears to link far-flung members of the network and to promote the flow and diffusion of information. Networks of faculty members are also often small worlds, in which individuals form tight clusters with small local groups, and simultaneously hold distant ties to a handful of remote clusters.

By examining the shapes of these clusters, researchers have mapped out the relations between disciplines and departments, and among specialties within a discipline. As these structures develop over time, it is possible to observe the emergence of new research areas and the waning of older ones.

Network scholars have demonstrated that the level of connectedness of collaborative networks varies across fields: disciplines in the natural and physical sciences tend to collaborate more often, and in larger teams, than those in the social sciences or humanities. The "optimal" amount of collaboration also differs across fields, but many disciplines show a non-monotonic relationship between collaboration and productivity or impact: at the low end, additional collaboration improves productivity and increases impact, but too much collaboration can spread researchers thin and can dampen these outcomes. Network position also influences productivity: those

who span disciplines either in their own research or through their collaborative ties have the opportunity to act as brokers between different fields, and this may increase the quantity and quality of their research. In all cases, good communication is essential to scholarly production; interinstitutional and international collaborations can produce innovative, high-impact research, but to do so, they must, like local collaborations, overcome barriers to communication.

Finally, an understanding of the ties among individuals, teams, and organizations illuminates how actors in a network can influence their neighbors. Connections to a highly productive scholar tend to make a researcher more productive. Researchers also transfer beliefs and habits through their ties: about methods of analysis, about references to cite, and about the use of technology. Ties can also influence the decision of what to study and whether to investigate questions of basic science or applied research.

We also find several gaps in important areas. To date, much research has focused on networks of individual scholars. We see opportunity to learn more about connections among teams and labs, among disciplines, and among universities. Research at the individual and publication levels demonstrates that interinstitutional or international collaborations may produce higher-quality publications; this phenomenon has not been examined nearly as much at the organizational level. How can universities promote such collaboration? How do universities vary in their tendency to reach out beyond their walls? How can such connections be forged, and what factors may cause them to disintegrate?

Little research has investigated positional network effects on publications, asking, for example, how the mix of references a paper cites may shape its success and its spheres of influence. Do papers that cite across disciplines get cited across disciplines? We have discussed limited evidence that papers citing multiple disciplines fare well in the natural science but poorly in the social sciences; this finding has not been repeated or investigated in further detail. Similarly, there is very limited work that makes comparisons between different networks of individuals, publications, or organizations. How do differing network shapes determine outcomes of interest? By considering multiple networks in juxtaposition, we can learn more about which features best promote the flow of information, spark the generation of new ideas, or facilitate trust among participants.

The last two decades have been a period of rapid advance in computing power and statistical methods. Very recent publications have had access to means of data collection and analytical analysis that simply did not exist when some of the earlier works reviewed here were written. We encourage scholars continuing these lines of research in the future to take advantage of state-of-the-art statistical models, including Exponential Random Graph Models, which allow inference about network properties, and longitudinal models like SIENA, which allow us to investigate the formation and development of ties over time. Early works discussed above used surveys to collect self-reported data on individuals' connections; while valuable, such data is only as complete as the subject's recall. Today, scholars have many more options for data collection, from complete databases of published work, to e-mail corpora, to in some cases complete datasets maintained by universities covering faculty work and relations.

As computational power increases, larger datasets can be considered. Many of the studies on collaborative tie formation are based on a sample from a single discipline or university. While more recent work has begun to take advantage larger databases of published work, much remains to be done. For example, the role of gender-based homophily in tie formation is not well understood; to date the research is contradictory. However, all studies reviewed here covered relatively small samples on individual fields or an individual funding source. Conceptually, this problem is tractable; a definitive answer awaits only a large, suitable dataset.

Outside of higher education research, the state-of-the-art research on peer influence is tending toward experimental designs (Centola, 2010, 2011; Salganik, Dodds, & Watts, 2006). It is not immediately obvious how to experimentally investigate the factors affecting faculty collaboration (Randomly assign researchers to work together? Persuade a funding agency to fund projects at random? Expose only certain populations of researchers to a new Request for Proposals?), but with the right experimental design, we could learn much. In the absence of experiments, causality is best inferred through sophisticated statistical models, including quasi-experimental designs, propensity scores, and instrumental variables (Aral, Muchnik, & Sundararajan, 2009). Such approaches are coming into wider use in social network analysis and provide valuable insight.

Universities as Sites of Student Education

We now turn to the literature on students' social networks in higher education. Here, we follow the same basic organization as in the faculty literature: descriptive work, work that uses networks as a dependent variable, and work that uses networks as an independent variable. Several important questions are investigated in this literature, including students' attitudes on race, factors influencing student achievement, and the role online social networks play in students' lives. On the whole, though, this body of research is less well developed and less varied than that concerning networks among faculty members. The vast majority of the work discussed below takes individuals as the nodes of the networks; we have found no research that considers networks between groups or teams of students, and few considering networks of universities or other organizations.

Descriptive Work

Node: Individual

Long before the words "network analysis" had entered the social science lexicon, research on intragroup processes in social psychology tapped college students as an informative study population. In 1950, Festinger, Schachter, and Back investigated married students living in the Westgate Housing Project at MIT. Couples were randomly assigned to apartments, and all were of similar background. The authors

found that students were most likely to know, to like, and to spend time with others who lived closest to them; they termed this the *propinquity effect*.

In another classic from social psychology, Newcomb (1961) studied incoming freshmen at Bennington College, a liberal arts women's college. He found that most entering students were politically conservative, and most graduating seniors were politically liberal. During their 4 years, students experienced pressures to conformity: friendships, recognition, and rewards were based on conforming to the liberal norm. The more involved students were on campus, the more likely their attitudes were to change. Most remarkably, students' attitudes not only shifted during their time at college, but they retained their liberal beliefs for over 30 years after graduating.

While neither of these studies adopted an explicit network lens, together they laid the groundwork for much that follows. Festinger, Schachter, Back, and Newcomb recognized that the unique characteristics of university housing, and the total-institutional experience of college, provide an ideal situation in which to investigate fundamental social processes. These processes operate in many settings, but few others provide the prospect for as clear study as the college setting. More important, the phenomena they describe—propinquity, peer influence, and the power of social norms—continue to intrigue and inspire researchers. With new data sources and research methods available today, scholars have expanded opportunities to build on the foundation laid in these early investigations.

In one of the earliest pieces explicitly studying social networks in higher education, Salzinger (1982) surveyed students about their friendships and connections, collecting data on juniors and seniors living in Harvard dormitories. Although she did not use this terminology, she essentially identified small-world networks, in which student friendship groups formed tight clusters, with fewer, looser ties linking between clusters.

In sum, the descriptive literature on social networks among students is quite thin. It is unfortunate that the threads initiated by Salzinger, Newcomb, and Festinger, et al. have not been picked up more actively in current work. The field lacks a rich body of descriptive work portraying the student experience of college from a network perspective. This leaves us with little understanding of the nature of friendship groups in college and of the large social structures governing the relations between students at a pivotal time in their lives.

Node: Country

While there is a rich literature on international student exchange, only a few researchers frame their investigation in network terms. These articles draw on data from UNESCO Statistical Yearbooks and conceptualize countries—rather than individuals—as the nodes in the network. Exchange students from one country to another constitute the ties in these networks. Barnett and Wu (1995) examine data from 1972 to 1989 and address their research questions in the tradition of World System Theory. At both time points, the authors find a single connected component with Western, industrialized countries in the most central positions and Eastern European countries more peripheral; however, the Soviet Union gained a great deal

in centrality between the two periods. African countries drop out of the exchange network, while Asian countries increase in number. Over time, clusters become more diversified, and colonial/linguistic similarity becomes less important.

Chen and Barnett (2000) repeat the same basic approach, using UNESCO data from 1985, 1989, and 1995. Their findings are quite similar to Barnett and Wu's; additionally, they identify three sets of structurally equivalent countries: the core, the semi-periphery, and the periphery. They find that several Eastern European countries moved toward the center over time, while former Soviet republics tended to enter as new, peripheral members of the network. Meanwhile, former British and French colonies in Latin and Central America and Africa become more peripheral over time, while Asian countries gained in centrality.

From these articles, we learn that countries, like individuals, can take on roles in student exchange networks, acting as origins or destinations of exchange, and a central or peripheral role internationally. The changes observed over time reflect concurrent dynamics in the world polity: the Soviet Union and former Eastern Bloc countries become more active in the exchange network after the fall of the Iron Curtain; colonial nations become less active after independence, presumably because their ties to former imperial powers attenuate, and over time, Asian countries have taken a more active role in exchange with other nations. These trends suggest that international student exchange follows on the tails of changes in international relations, but it is plausible to imagine the opposite sequence: increased exchange between two countries can promote or cement strong relations between them. To our knowledge, this hypothesis has not been investigated through a social network lens.

Networks as Dependent Variable

Node: Individual

As with network analyses of faculty members, research into the factors that generate networks among students often focuses on processes of homophily and propinquity. Many of these articles address the question of what role race and ethnicity play in friendship formation and explore variation in the social networks of students of different races. Three articles (DeFour & Hirsch, 1990; D'Augelli & Hershberger, 1993; Kenny & Stryker, 1994) use survey data on social networks to investigate this question. All three ask students to name important people in their lives or members of their support network. They then compared the size and density of the social networks listed by students of different races. Broadly, they find that students of color tend to have smaller, less dense social networks than their white counterparts; that they are likely to know fewer people on campus when they arrive; and that their networks contained fewer people who had gone to college.

Mayer and Puller (2008) matched data obtained from Facebook to university administrative data, drawn from ten universities in Texas. They find that the friendship networks at the ten universities are segmented by race, major, cohort, and political orientation. In the observed network, the fraction of friends with similar ability, parental education, and political orientation does not differ substantially from the

fraction that would be generated by random assignment of friends, suggesting that diverse interaction does occur. They conclude based on simulations that racial segmentation is largely driven by preferences rather than institutional features that affect meeting and that changes to university policies have limited ability to reduce racial segmentation.

In contrast, findings from several other studies support a general consensus that increased exposure to students of different races promotes friendships. Having a different-race roommate and having more contact with out-group students are both associated with having an increased number of out-group friends (Schofield, Hausmann, Ye, & Woods, 2010; Shook & Fazio, 2011; Van Laar, Levin, Sinclair, & Sidanius, 2005). Baker, Mayer, and Puller (2011) use data from Facebook to show that students randomly assigned to racially diverse dorms tend to make more cross race friendships within the dorm, but their friendships outside the dorm appear unaffected. Further, students' implicit racial attitudes predicted the longevity of inter-race roommate relationships; these effects can be mediated if students perceive commonality with their roommate, and the gap in positive emotion between same-race and interracial pairs declines over time (Shook & Fazio, 2008a; Towles-Schwen, & Fazio, 2006; West, Pearson, Dovidio, Shelton, & Trail, 2009). Similarly, Levin, van Laar, and Sidanius (2003) find that attitudes students hold as freshmen, including in-group bias and intergroup anxiety, influence the friendships they form in later years. Wejnert (2010) finds that students are more likely to have same-race friends than would occur under random mixing but that when cross race ties do form, they are as strong and as embedded as same-race ties.

Using Facebook data on a complete cohort of 1,600 students from one college, Wimmer and Lewis (2010) supply a nuanced response to the question of race and friendship formation. They find that racial homophily, while important, does not represent the dominant principle of tie formation among the students in their sample. Homophily on other types of attributes—including tastes in music and culture, often captured through interests listed on Facebook profiles—surpasses students' tendency toward racial homophily. Notably, socioeconomic status also emerges as an important dimension of social closure among these students, with students from elite high schools likely to befriend each other. Racial homophily, they claim, is "dwarfed" by propinquity mechanisms: having been assigned by the college to the same dorm room increases the log-odds of two students becoming friends by 1.9. Sharing the same residence has more than double the effect on the log-likelihood that a tie between two students will form than sharing the classification of being white or Asian. Less consequential, but still as important as white and Asian homophily, are the effects of shared foci for students who choose certain academic majors: economics, general social science, and microbiology. Reciprocation and triadic closure—structural features of the network—are also more important than racial and ethnic homophily.

The factors influencing friendship formation appear to vary over time for a cohort. van Duijn, Zeggelink, Huisman, Stokman and Wasseur (2003) examined friendship formation among freshmen and find that, initially, proximity and visible similarity predict friendships, but they decline in importance over time, whereas network opportunity remains important in all time periods. Similarly, Godley (2008)

finds that gender and racial homophily significantly predict friendship formation during freshman year, while religious preference and joint club membership become more important in later years. This finding echoes those from the faculty networks, in which the effects of homophily appeared to weaken over longer relationships.

Homophily based on other traits also influences friendships. Lee, Scherngell, and Barber (2011), using data spanning several universities from a German online social network, find that online acquaintanceship is predicted by geographic distance and the similarity of students' home institutions. Traud, Kelsic, Mucha, and Porter (2011) study Facebook data from five geographically diverse, selective universities in the United States and identify which user traits are most strongly associated with friendship clusters; they find a high degree of demographic-based clustering, with dorm, class year, and major playing important roles in determining friendships. Similarly, Pilbeam and Denyer (2009) studied doctoral students in the UK and found they are more likely to be aware of others if they are in the same program and if they started the same year. In addition, they find that students who have been in school longer have more ties and that students' ties are multiplex, exchanging many kinds of support and resources.

Scholars have also used data from online social networks to study how friendships form. Lampe, Ellison, and Steinfield (2006) conclude that students do not make friends on Facebook but rather use Facebook to reinforce connections made offline. However, Ellison, Steinfield, and Lampe (2007) find that, controlling for other factors, the extent of students' Facebook usage predicts the formation of both bridging and bonding social capital. For a rich, ethnographic portrayal of student use of online social networks and the role these play in mediating identity and social connection, see Martinez Aleman, and Wartman (2009).

Using the same dataset as Wimmer and Lewis (described above), Lewis, Kaufman, Gonzalez, Wimmer, and Christakis (2008) show that students' network behaviors on Facebook are predicted by their gender, race, and ethnicity, and students sharing social relationships as well as demographic traits tend to share a significant number of cultural preferences. An overlapping set of coauthors (Lewis, Kaufman, & Christakis, 2008) identifies patterns among students in their tendency to make their Facebook profiles public or private.

Other work is more methodological in its focus. Brewer and Webster (1999) examined how large an impact faulty memory can have on network studies. Researchers asked the undergraduate population of a residence hall to list all their friends in the hall. They subsequently provided the respondents with a list of all students living in the hall and asked them to indicate their friends. They found that, on average, students forgot 20% of their friends. The friends' demographic characteristics did not appear to be related to their likelihood of being forgotten. The omissions were found to impact network measures, including density, number of cliques, centralization, and individuals' centralities. The authors did not investigate whether students' network position influenced their likelihood of being remembered, which would be interesting for further work.

Burt (2001) studied the persistence of ties over time, surveying women graduates of an MBA cohort. He finds that the decay of ties is inhibited when connections

with GSB graduates are embedded in stable relations of family, work, or long-term friendship; an alumna's attachment today was largely determined while she was in school.

As with the faculty literature using networks as the dependent variable, the student literature on friendship formation also focuses on the mechanisms of homophily and propinquity. There is consistent evidence that students show preference for friends like themselves in terms of race and ethnicity, socioeconomic background, and age, as well as tastes for cultural consumption and coming from similar high schools. These preferences can be overcome when students have extra interactions with diverse others, for example, being assigned to a roommate of a different race or a mixed-race dorm. Physical and social propinquity matter as well: students are most likely to become friends with those who live geographically close by, with those who entered in their own cohort, and with those in the same program of study.

Networks as Independent Variable

Research investigating student social networks as an independent variable has tended to focus on two main types of questions: how social networks impact academic achievement and retention and whether they influence students' attitudes toward race and cultural awareness. To date, the latter has been a smaller field of inquiry, though certainly a substantively important one. Antonio (2001), in a survey of undergraduates at UCLA, a racially diverse campus, finds that most students' friendship groups are racially mixed and that students whose friends are more self-confident and materialistic report lower gains in cultural awareness, as do commuter students and members of fraternities and sororities. Other researchers have found that respondents in mixed-race dyads report less positive emotion and are less likely to continue to room together than those in same-race dyads (Shook & Fazio, 2008b; Trail, Shelton, & West, 2009). Negative emotions in interracial pairs may be driven primarily by negative feelings among white students in the pairs (Towles-Schwen & Fazio, 2006).

The literature on academic performance is more robust and varied. Among the earliest work in this area, Antrobus (1988) considered two main research questions: is social network size related to GPA or to likelihood of retention, and are a student's friends' GPAs related to their own? The authors surveyed incoming students at a community college and sent follow-up questionnaires to their named friends to see if friendships were reciprocated. This sociometric data was linked to administrative data from the college, including GPA. The study found a correlation between students' GPAs and their friends' GPAs but found no relationship between network size and retention or GPA.

Baldwin, Bedell, and Johnson (1997) surveyed an entire MBA class, which had been partitioned into four cohorts, each of which was broken into teams of 3–5 members; teams and cohorts were stable over the first year. The authors assessed friendship, communication, and adversarial relationships, finding that these networks clearly matter for educational outcomes, including student satisfaction, team

performance, and individual grades. Friendship and communication relationships were formed primarily within assigned teams, and levels of communication within teams were directly and strongly associated with perceptions of team effectiveness and workload sharing. The artificial nature of this situation, in which students are assigned to teams and must maintain them throughout the year, makes it difficult to generalize to more naturalistic settings.

Others have investigated whether the size or density of a student's social network predicts her achievement. Fletcher and Tienda (2009) find that freshmen who enter the University of Texas at Austin with a large cohort from their high school perform better than those who enter with a smaller cohort. In another study of entering freshman, Skahill (2003) finds that residential students who make more friends connected to the school more likely reach personal and academic goals; in contrast, commuter students are the least likely to persist in school.

The effect of additional friendships is unlikely to be completely simple, however. Thomas (2000), in a survey of college freshmen, finds evidence that the effect of additional friendships on GPA and on educational commitment is positive for those with few friends, but negative for those with many; the students who performed the best and were most committed were those with 7–17 friends on campus. Additionally, Smith and Peterson (2007) surveyed students about advice networks, inquiring which classmates they asked for either general or class-related advice. Their results indicate that the more classmates ask a student for general advice, the more poorly the student performs; however, the more classmates ask for class-related advice, the better the student performs. The authors argue that when predicting achievement and engagement in school, it is not solely the size of the social network that matters but also the content of the ties.

Rizzuto, LeDoux, and Hatala (2009) find that in a course relying heavily on educational information technology, the density of a student's social network was a stronger predictor of performance than was prior experience with educational technology. Rovai (2002) considered students in a distance learning program using the Blackboard software package and found that students with a stronger sense of classroom community in the course perceived themselves to be learning more than their peers. Dawson (2010) also collected data through Blackboard, but here the software was used as a supplement to an in-person chemistry course; he finds that high-achieving students form more connections on Blackboard than do low-achieving students, that most of their ties are to other high-achieving students, and that they are more likely than low-achieving students to forge ties to teaching staff.

Other scholars have examined the effect of online social networking sites on student happiness, well-being, and civic engagement. Facebook usage was found to interact with measures of psychological well-being, suggesting that it might provide greater benefits for users experiencing low self-esteem and low life satisfaction (Ellison et al., 2007). Valenzuela, Park, and Kee (2009) also find a positive association between Facebook use and various measures of social well-being and civic engagement.

In economics, a distinct literature examining peer effects asks related questions about the role of roommates and other close relationships in influencing academic

performance and attitude formation. This cluster of authors shows high mutual awareness but is unlikely to cite articles from outside of the economics literature. By and large, these studies are more concerned with achievement (usually, GPA) and choice of major, rather than with attitudes toward race and ethnicity, or well-being. These articles rely on a mixture of survey data from students and administrative data, usually including both academic information from the university and data from college applications. In one of the pioneering works in this tradition, Sacerdote (2001) studied sets of randomly assigned freshman roommates at Dartmouth. He finds that peers have an impact on grade point average and on decisions to join social groups such as fraternities but do not influence other decisions, such as choice of college major. Peer effects in GPA occur at the individual room level, whereas peer effects in fraternity membership occur both at the room level and the whole-dorm level. Zimmerman (2003) and Winston and Zimmerman (2004) substantiate the findings on GPA, but only for the middle 70% of the class: no effect was observed for the top or bottom 15%. Hoel, Parker, and Rivenburg (2005) use 10 years of data from Reed College and find a significant effect for roommates and dorm-mates on GPA, but not for classmates. Stinebrickner and Stinebrickner (2006) find that both roommate's GPA and roommate's family income are significant predictors of academic performance. Using data from the US Air Force Academy, Carrell, Fullerton, and West (2009) find large effects at the squadron level and smaller effects at the roommate level. Brunello, De Paola, and Scoppa (2010) find the roommate effect to be significant only for freshmen in the hard sciences and not for those in the humanities and social sciences. Hasan and Bagde (2012) find a significant causal effect of roommate's ability on GPA. At the graduate level, Arcidiacono and Nicholson (2005) find that among medical students, classmates' verbal MCAT scores and preferences for high-income specialties predict higher own board scores. Looking beyond the effect of a roommate's academic ability on a student's performance, Duncan, Boisjoly, Kremer, Levy, and Eccles (2005) find that male students who were binge drinkers in high school were more likely to continue to drink heavily if paired with a binge-drinking roommate (the effect was not observed for female students).

Not all studies find evidence of peer effects. Foster (2006), in a study at the University of Maryland; McEwan and Soderberg (2006) at Wellesley; Siegfried and Gleason (2006) at Vanderbilt; and Lyle (2007) at West Point find that peers' GPAs do not predict students' performance. Neither Foster nor Lyle examined the roommate relationship: Foster used dorm-mates, while Lyle considered cadet companies at West Point. That these larger peer groups did not significantly predict GPA is consistent with other findings (e.g., Hoel et al., 2005). While Siegfried and Gleason find roommates to be nonsignificant in general, they find a significant relationship for students in the top academic quartile of the class, when they are paired with a roommate who is also from the top quartile.

The literature on student networks as an independent variable explores several important questions. While the evidence on peer effects is not without ambiguities, on the whole it appears clear that having a high-achieving roommate can boost a student's performance in school. Similarly, friendships can influence students' attitudes toward members of other races and ethnicities. Finally, students

fare best in college when they have a set of strong connections to peers, but their academic performance and commitment to school may falter if they have a very large number of friends.

Student Network Summary

In sum, research on student networks in higher education is less extensive and less diverse than research on faculty networks. As in the faculty literature, scholars find that homophily and propinquity play important roles in promoting ties between individuals—here, friendship ties among students. At the same time, the effects of homophily can be overcome: additional exposure to classmates from different backgrounds makes students more likely to form friendships that cross racial, ethnic, and socioeconomic boundaries. Moreover, this additional exposure also may promote more open-minded attitudes among students toward classmates of different races than their own. Interestingly, one key mechanism in overcoming the effect of homophily is propinquity: being roommates or dorm-mates with diverse others increases the likelihood of becoming friends with them.

Scholarship has also demonstrated that a strong set of connections to classmates is important for students' success and happiness in school; at the same time, too many friendships can hamper students' performance in school. The assignment of a roommate appears to have small but significant effects on student achievement as well as on other behavior, such as drinking and drug use.

While the literature on student social networks in institutions of higher education provides numerous useful insights, the field remains fragmented. In part, this is because the field lacks broad, synthetic works that integrate these multiple perspectives. We know that peers can have an effect on student achievement and that they can shape students' attitudes toward classmates from different races and ethnicities. How do these multiple forces interact over students' college years? How do we situate the research on dyadic effects within a more holistic framework? How do these dyadic interactions cumulate into a larger social structure? To date, little has been done to address these questions, but newly available data and methods makes it increasingly practical to do so.

Moreover, much of this field is focused on networks at the level of the dyad. Researchers ask how the set of ties a student holds—for example, friendships, roommate relationships, and sometimes classmates or dorm-mates—affects her achievement or attitudes. Conversely, they investigate factors that lead to the formation of friendships. Very little work has been done that examines student networks at a more global level, asking, for example, what is the structure of a university social network? What is the network of course-taking and career flows? Does a student's position within the university social network influence his experience of college? Do student attributes influence their positioning? Do particular groups of students—for example, fraternities or sororities, sports teams, or students from particular socioeconomic backgrounds—occupy positions of more or less importance in the network?

Nor do we find research that asks comparative questions, such as do universities vary in how their students organize social ties? Are social networks at different

universities characterized by differing network shapes—more or less segregated, more or less connected, more or less clustered—with shorter or longer average path lengths? What can these differing shapes tell us about the culture of an institution or about the experience of being a student there?

Universities as Sites of Student, Faculty, and Staff Interaction

We have found only one text that considers the university social network as a whole. Kossinets and Watts (2006, 2009) describe how network processes generate individual networks. They base their study on a large e-mail corpus representing over 30,000 undergraduates, graduate students, faculty, and staff at a single university over 1 year. The authors examine the cyclical interplay of personal homophily and triadic closure. They find that members of the network preferentially choose friends and contacts who are similar to themselves. These choices bring the members closer to their friends' friends, whom they are likely to befriend and who are also likely to be similar to themselves. They argue that, over time, or "generations" of friendship formation, such cycles can account for much of the observed assortativity of social networks. While the effects of homophily and triadic closure in friendship formation are well documented, this is the first study we know of that illustrates how these two phenomena interact and mutually reinforce one another over time.

Kossinets' and Watts' work is remarkable not only for the complexity of the model their data allows, but because theirs is the only dataset we encountered that included both student and faculty networks as well as staff. While neither of the papers discussed here investigates patterns of interaction between students and faculty, between faculty and staff, or among other combinations spanning these groups, it seems that the data would allow this. One could imagine a number of questions of interest: are undergraduates more likely to graduate on time or to perform better if they are in contact with professors early on? Do universities or departments vary in how accessible staff members are to students, and if so does this variation explain differences in student outcomes? Are professors who are in frequent contact with undergraduate or graduate students more or less productive in their research than those who are less often in contact? As additional, similar e-mail corpora become available in the future, we may gain a clearer picture of the day-to-day life of colleges and universities and attain valuable insight into the factors that most contribute to the experiences of students, faculty, and staff.

Not only does their data open up opportunities to probe these unanswered questions, but it is the sort of dataset that was once unheard of and is today increasingly available. We hope that more researchers will take advantage of similar new corpora as they appear and will perhaps even take a hand in creating them.

Analytical Discussion

In comparison, the research on students and faculty seems to emphasize distinct questions. Most obviously, the faculty literature focuses on work, asking how

knowledge is generated and consumed, while the student literature focuses more heavily on friendship, attitudes, and achievement. However, certain empirical efforts may inform each other. In both cases, we find that certain basic social mechanisms apply across populations. Collaborative ties and friendship ties alike are shaped by the mechanisms of homophily, propinquity, and triadic closure. Preferential attachment is clearly very important in faculty networks; to our knowledge, no one has examined its role in student social networks, but it is intuitively quite plausible. We expect that for students with a lot of friends, it is much easier to make new friends than for those with few. At a college where most students enter knowing almost no one, how do these processes take shape? Where are the initial connections forged? Do they last, or are they supplanted? The unusual nature of residential colleges and universities—where students leave their homes and friends behind to start anew in an unfamiliar social and physical environment—provides a unique opportunity to study these fundamental social processes.

Similarly, we can ask whether student social networks, like faculty collaborative networks, form core-periphery structures. There are good reasons to assume they do. What are the mechanisms through which students move in to the core or fall back to the periphery? Are there any processes that speed or slow these forces? Are there implications for students' well-being or achievement in college? We know that students with very many or very few ties are less engaged in college and achieve less than those with a moderate number of connections. How, if at all, does a student's location within the larger social structure of the university mediate that effect? Does it matter whether these connections are formed in class, residences, or through extracurricular activities?

In both populations, we wish to encourage more work that compares across multiple networks. How do the social structures of colleges and universities differ from one another? What are the relative roles of faculty, students, staff, and administrators? We think it likely that institutions vary in the relative positions of the members of these different groups: we speculate that there are universities that are tightly run by administrators and others where faculty wield more decision-making power, some where key staff members may act as gatekeepers, and perhaps some where students are well integrated with these other groups. How much variation exists? What generates that variation, and what implications does it hold for life at the university?

Much of the research reviewed here comes out of disciplines with strong traditions of methodological individualism; this work still carries that legacy, even as it asks questions about dyads, groups, connections, and relations. As the study of social networks in higher education matures, we hope it will break free from this legacy, posing and addressing questions about social structures more broadly.

Analysis of the Literature as a Co-citation Network

Our prior focus on analytic distinctions helped us define a conceptual space and to locate ongoing research within it. From that exercise, we gained a sense of where prior research has focused and what sorts of questions it has addressed. But how are the

authors in this field coordinating their efforts and associating these texts to one another? To answer these questions, we investigate the corpus empirically. In particular, we use techniques from social network analysis to inform our understanding of the literature on social networks in higher education and to help us visualize how these publications relate to one another. We use a community-detection algorithm to identify three main communities of scholarship within this literature. We find that these communities reflect the analytical divisions we have identified, though not perfectly. Moreover, they reflect areas of substantive interest and connections to disciplinary traditions. These clusters provide a compelling illustration of the multiple, incipient communities that comprise the study of social networks in higher education.

Empirical Analyses

Our initial analyses attempt to identify whether the collaborations between authors in this corpus form something akin to a “thought community” in the coauthorship network—a group of mutually aware scholars working on similar problems and sharing consensus on an intellectual paradigm (Fleck, 1981). We find that research on social networks in higher education has a very sparse collaboration network. Since authors are mostly unrelated, we next ask how the texts are related to one another; we want to determine if the texts published in this area rely on the same references (i.e., a co-citation network). In particular, we ask if this area of research is segmented into sets of works emblematic of different disciplinary and analytic tastes, and we seek to identify potential areas for cross-fertilization.

To study the pattern of co-citation, we conceptualize the literature as a two-mode network: the publications we have gathered (mode one) and the references they cite (mode two). To create this network, we gathered the list of references from each of the publications we reviewed, which we were able to obtain in machine-readable format. Some literature was excluded: books that we were only able to access in print and any articles that had been scanned or otherwise converted to PDF without optical character recognition are not included in this analysis. Starting from the complete list of references for these publications, we extracted the title of each cited work, using a set of regular expressions. Again, some literature was excluded at this step due to irregularly formatted citations. There is some bias involved in this process: older articles were less likely to have machine-readable citations, and physics journals (including many of the numerous, influential works of Mark Newman) were more likely to list citations in a difficult-to-parse format. However, we feel the set of works captured is diverse and complete enough to yield valuable insights. We performed manual spot-checking to look for false matches—cases in which two different references shared the same title and thus were falsely equated. We found no instances of false matches and are confident that if such matches do exist, they are infrequent and would not engender a significant change to our findings.

We then generated the two-mode network using both the publications and their references. This yielded a network of 152 publications, 5,740 references, and 6,986 ties among them; this represents 52% of the complete review. Through matrix

multiplication, we converted this two-mode network to a one-mode network of publications. This derived network contains only the 152 publications from this literature review; the tie between two publications reflects the number of citations they jointly reference.

Having obtained this network of publications, we wanted to search for communities of scholarship within it. We used the Newman-Girvan betweenness community-detection algorithm, a widely used method, implemented as the `edge.betweenness.community` routine in the `igraph` network analysis package in R (Newman & Girvan, 2004; Csardi & Nepusz, 2006). We ran this both with the original one-mode network, in which pairs of publications could have multiple ties between them, and on a simplified network in which the edges between pairs were dichotomized (the value is one if there are any edges between them, zero otherwise), and they yielded nearly identical results.

The Newman-Girvan algorithm identifies communities in the network by first calculating the “betweenness” of each tie in the network, defined as the fraction of shortest paths between pairs of nodes that pass through that tie. That is, it is the count of shortest paths between two nodes, s and t , that include the tie, divided by the total number of shortest paths between s and t . The algorithm iteratively removes from the network the tie with the highest betweenness and then recalculates the betweenness of all remaining ties. The rationale is that ties with high betweenness are those that link distinct communities; removing these ties reveals the communities inherent in the network. Typically, scholars identify the optimal number of ties to delete from the graph by considering the modularity of the resulting set of clusters. Modularity is a measure of how well a partitioning of a graph divides the network by comparing how many ties fall inside of clusters relative to how many fall between clusters.

We found that the modularity of the publication network showed several large increases with early tie removal, then leveled off, increasing only slowly with the removal of additional ties, before finally dropping precipitously when few ties remained. We chose to remove just enough ties to reach the early peak in modularity, before the leveling off. Later tie removals tended to remove single nodes from clusters; stopping where we did allowed us to identify the major clusters in the graph, without breaking the network into a series of individual nodes. These clusters effectively relate sets of texts that draw upon the same literature in their references.

Figure 4.3 shows the article network, color-coded by these three clusters: white, light gray, and dark gray. Articles that are not included in these three clusters are shown in black; they are uniformly located on the periphery of the network. Articles coded as student-focused are shown as squares, while those coded as faculty-focused are shown as circles. A line connecting two nodes indicates that they share at least one reference in common. It is possible for texts to share many references in common; this is reflected in a darker line connecting the two nodes.

Table 4.2 shows the article represented by each of these nodes; it lists the cluster of each article, its citation, and the node number labeling it in Fig. 4.3. Additionally, Table 4.2 shows which articles belong to each of the analytical categories described in the first section of the chapter. Glancing through the table

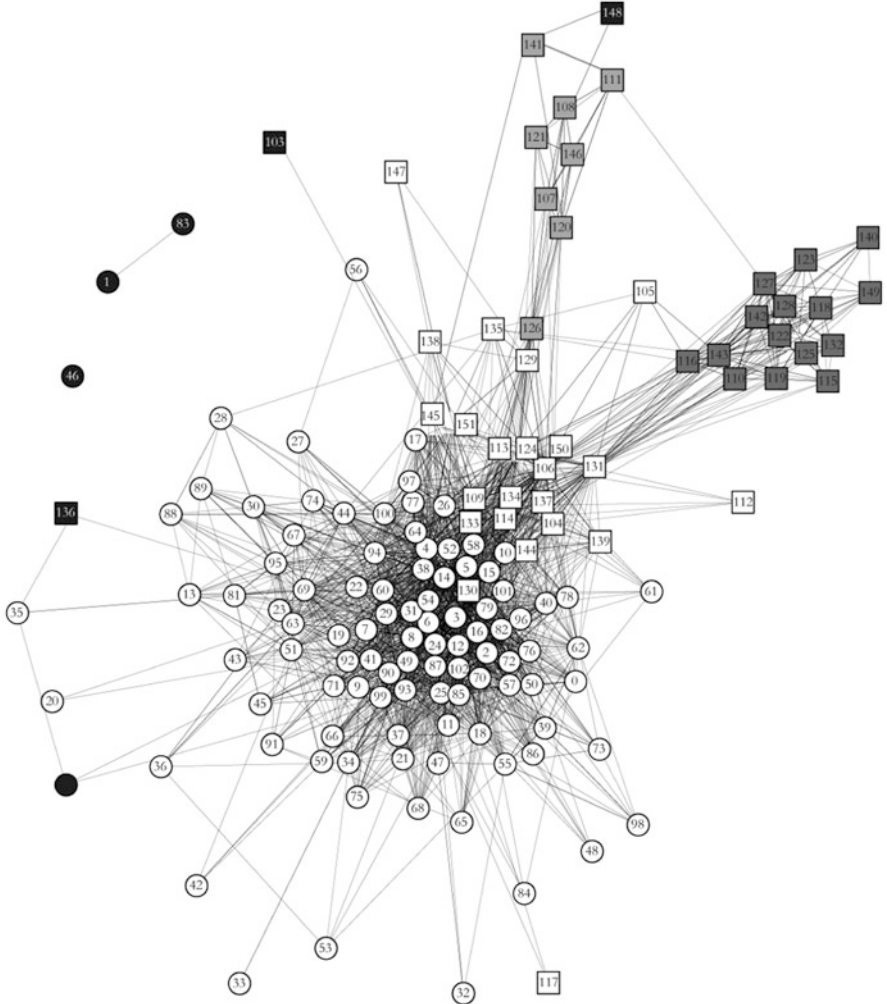


Fig. 4.3 All articles, color-coded by cluster. *Circles* articles on faculty, *squares* articles on students

or examining the distribution of circles and squares in the network in Fig. 4.3, the reader will note that the clusters reproduce the division between student-centered and faculty-centered research fairly faithfully. Clusters 2 and 3 are made up solely of student-centered work, while cluster 1 is overwhelmingly composed of faculty-centered research.

Cluster 2, shown in light gray in Fig. 4.4a, is the smallest of the three clusters, at eight articles. These articles explore student adjustment to campus life, changes in racial attitudes, and roommate relationships. In particular, these articles examine how experiences at college, and especially interactions with roommates, can shape—and

Table 4.2 Summary information on articles in the complete network

Cluster	Node #	Cite	Betweenness	Individual	Team/pub	Organization	Descriptive	Independent	Dependent	Faculty	Student
1	0	Kretschmer (2004)	0.82	x				x		x	
1	2	He et al. (2011)	86.4	x				x		x	
1	3	Yang et al. (2010)	237.94	x				x		x	
1	4	McFadyen et al. (2009)	213.71	x				x		x	
1	5	Powell et al. (2005)	328.77			x			x	x	
1	6	Franceschet and Costantini (2010)	80.95	x			x			x	
1	7	Breiger (1976)	11.98	x			x			x	
1	8	Acedo (2006)	344.61	x					x	x	
1	9	Babchuk et al. (1999)	7.02	x			x			x	
1	10	van der Leij and Goyal (2011)	13.24	x					x	x	
1	11	Leydesdorff and Wagner (2008)	33.93			x	x			x	
1	12	Milojevic (2010)	223.69	x					x	x	
1	13	Agrawal and Goldfarb (2006)	3.92	x					x	x	
1	14	Lambiotte and Panzarasa (2009)	227.39	x			x			x	
1	15	Roth and Cointet (2010)	123.49	x					x	x	
1	16	Perc (2010)	65.58	x			x			x	
1	17	Friedkin (1980)	0	x					x	x	
1	18	Perianes-Rodriguez et al. (2010)	26.93	x			x			x	
1	19	Crane (1969)	17.84	x			x			x	
1	20	Usdiken and Pasadeos (1995)	0		x				x	x	
1	21	Johnson and Oppenheim (2007)	4.52	x				x		x	
1	22	Lazega et al. (2008)	30.44		x		x			x	
1	23	Gulbrandsen and Smeby (2005)	24.84	x				x		x	
1	24	Rigby and Edler (2005)	123.19		x			x		x	
1	25	Glanzel and Schubert (2004)	59.25	x					x	x	
1	26	Leahey (2006)	39.8	x				x		x	
1	27	Hellsten et al. (2007)	9.04	x			x			x	
1	28	Fontana et al. (2006)	5.63			x			x	x	
1	29	Shwed and Bearman (2010)	26.75		x				x	x	
1	30	Murray (2002)	6.66		x		x			x	
1	31	Moody (2004)	261.72	x					x	x	
1	32	Kreuzman (2001)	0	x			x			x	
1	33	Kezar (2005)	0.03	x					x	x	
1	34	Hayashi (2003)	39.74	x					x	x	
1	35	Evans (2010b)	2.33	x				x		x	
1	36	Marques et al. (2006)	3.74			x		x		x	
1	37	Melin (2000)	3.22	x					x	x	
1	38	Friedkin (1978)	179.2	x			x			x	
1	39	Reader and Watkins (2006)	32.2	x			x			x	
1	40	Jo et al. (2009)	9.34		x			x		x	
1	41	Mullins et al. (1977)	12.88	x			x			x	
1	42	Waldinger (2009)	0	x				x		x	

(continued)

Table 4.2 (continued)

Cluster	Node #	Cite	Betweenness	Individual	Team/pub	Organization	Descriptive	Independent	Dependent	Faculty	Student
1	43	Azoulay et al. (2010)	1.18	x				x		x	
1	44	Owen-Smith and Powell (2003)	52.02			x		x		x	
1	45	Laband and Tollison (2000)	0.42	x					x	x	
1	47	Cottrill et al. (1989)	31.01	x			x			x	
1	48	Ramlogan et al. (2007)	0		x		x			x	
1	49	Bozeman and Corley (2004)	239.61	x					x	x	
1	50	Morel et al. (2009)	5.08	x			x			x	
1	51	Ding et al. (2010)	56.97	x					x	x	
1	52	Han (2003)	271.04			x	x			x	
1	53	Park and Leydesdorff (2010)	2.83	x					x	x	
1	54	Oliver and Ebers (1998)	212.56		x		x			x	
1	55	Nerur et al. (2008)	50.97	x			x			x	
1	56	Tight (2007)	0.39	x			x			x	
1	57	Durbach (2008)	3.58	x			x			x	
1	58	Rawlings and McFarland (2011)	818.64	x				x		x	
1	59	Haslam and Laham (2009)	1.02	x				x		x	
1	60	Dietz and Bozeman (2005)	382.45	x				x		x	
1	61	Lariviere et al. (2006)	1.22	x					x	x	
1	62	Pilkington (2008)	51.28		x		x			x	
1	63	Oliver (2008)	29.1			x	x			x	
1	64	Cummings and Kiesler (2008)	43.77	x				x		x	
1	65	Johri et al. (2011)	1.58	x					x	x	
1	66	Gossart and Özman (2008)	12.87	x			x			x	
1	67	Sorenson and Fleming (2004)	9.68		x				x	x	
1	68	Katz and Hicks (1997)	0	x				x		x	
1	69	Evans (2010a)	363.17	x				x		x	
1	70	Ding (2011)	160.15	x					x	x	
1	71	Sigelman (2009)	23.83	x				x		x	
1	72	Rodriguez and Pepe (2008)	17.31	x					x	x	
1	73	Gregoire et al. (2006)	2.96		x		x			x	
1	74	Balconi et al. (2004)	8.47	x				x		x	
1	75	Luukkonen et al. (1992)	0.93			x	x			x	
1	76	Wallace et al. (2012)	16.89	x				x		x	
1	77	McFadyen et al. (2004)	32.2	x				x		x	
1	78	Liu et al. (2005)	5.95	x			x			x	
1	79	Wagner and Leydesdorff (2005)	68.43	x					x	x	
1	81	Adams et al. (2005)	7.13	x					x	x	
1	82	Yan and Ding (2009)	69.21	x				x		x	
1	84	Heinze and Bauer (2007)	0.06	x				x		x	
1	85	Lorigo and Pellacini (2007)	48.76	x					x	x	
1	86	Madlberger and Roztocki (2009)	0.12	x				x		x	
1	87	Taramasco et al. (2010)	196.98	x					x	x	

(continued)

Table 4.2 (continued)

Cluster	Node #	Cite	Betweenness	Individual	Team/pub	Organization	Descriptive	Independent	Dependent	Faculty	Student
1	88	Motohashi (2005)	4.66	x				x		x	
1	89	Audretsch and Stephan (1996)	3.68	x					x	x	
1	90	Clark (2010)	138.03	x				x		x	
1	91	Lee et al. (2010)	0.52	x				x		x	
1	92	Shi et al. (2009)	12.8		x			x		x	
1	93	He (2009)	62.01	x				x		x	
1	94	Murray (2004)	291.16	x				x		x	
1	95	Oettl (2009)	47.19	x				x		x	
1	96	Pepe and Rodriguez (2010)	66.66	x					x	x	
1	97	Kraatz (1998)	14.76			x		x			x
1	98	Ellis et al. (1999)	0.18	x	x		x			x	
1	99	Hunter and Leahey (2008)	157.56	x					x	x	
1	100	Thune (2007)	73.4	x					x	x	
1	101	Kim (2009)	111.78	x					x	x	
1	102	Franceschet (2011)	43.66	x				x		x	
1	104	Wejnert (2010)	27.59	x					x		x
1	105	Baker et al. (2011)	0.04	x					x		x
1	106	Lewis et al. (2008)	937.61	x				x			x
1	109	Pilbeam (2009)	127.8	x					x		x
1	112	Hargittai (2008)	0.01	x			x				x
1	113	Godley (2008)	21.17	x					x		x
1	114	Kossinets and Watts (2009)	147.36	x					x	x	x
1	117	DeFour and Hirsch (1990)	0	x					x		x
1	124	Wimmer and Lewis (2010)	564.9	x					x		x
1	129	Lewis et al. (2008a)	20.19	x			x				x
1	130	Carolan (2008)	152.72		x		x			x	
1	131	Mayer and Puller (2008)	754.66	x					x		x
1	133	Smith and Peterson (2007)	92.54	x				x			x
1	134	Dawson (2010)	47.5	x				x			x
1	135	Lee et al. (2011)	19.01	x					x		x
1	137	Rizzuto et al. (2009)	26.77	x				x			x
1	138	Valenzuela et al. (2009)	7.33	x			x				x
1	139	Brewer and Webster (1999)	0.52	x			x				x
1	144	Baldwin et al. (1997)	7.39	x				x			x
1	145	Thomas (2000)	298.27	x				x			x
1	147	Lampe et al (2007)	0	x			x				x
1	150	van Duijn et al. (2003)	23.04	x					x		x
1	151	Ellison et al. (2007)	141.65	x			x				x
Cluster 1 total				100	14	9	37	42	43	100	23
2	107	West et al. (2009)	48.14	x					x		x
2	108	Shook and Fazio (2008a)	111.31	x				x			x
2	111	Levin et al. (2003)	27.17	x					x		x

(continued)

Table 4.2 (continued)

Cluster	Node #	Cite	Betweenness	Individual	Team/pub	Organization	Descriptive	Independent	Dependent	Faculty	Student
2	120	van Laar et al. (2005)	126.5	x					x		x
2	121	Towles-Schwen and Fazio (2006)	1.56	x					x		x
2	126	Trail et al. (2009)	147.18	x				x			x
2	141	Antonio (2001)	42.63	x				x			x
2	146	Shook and Fazio (2008b)	5.07	x					x		x
Cluster 2 total				8	0	0	0	3	5	0	8
3	110	Carrell et al. (2009)	23.6	x				x			x
3	115	Siegfried and Gleason (2006)	0	x				x			x
3	116	Fletcher and Tienda (2009)	29.53	x				x			x
3	118	Stinebrickner and Stinebrickner (2006)	0.17	x				x			x
3	119	Foster (2006)	17.93	x				x			x
3	122	Arcidiacono and Nicholson (2005)	8.61	x				x			x
3	123	Hoel et al. (2005)	1.88	x				x			x
3	125	Lyle (2007)	4.58	x				x			x
3	127	McEwan and Soderberg (2006)	43.98	x				x			x
3	128	Sacerdote (2001)	7.51	x				x			x
3	132	Winston and Zimmerman (2004)	0.17	x				x			x
3	140	Zimmerman (2003)	0.02	x				x			x
3	142	Brunello et al. (2010)	1	x				x			x
3	143	Sacerdote (2011)	267.66	x				x			x
3	149	Duncan et al. (2005)	0.74	x				x			x
Cluster 3 total				15	0	0	0	15	0	0	15
-	1	Lindelof and Lofsten (2004)	0			x			x	x	
-	46	Lee (2000)	0	x				x		x	
-	80	Leahey and Reikowsky (2008)	2.32	x				x		x	
-	83	Lindelof and Lofsten (2004)	0			x			x	x	
-	103	Rovai (2002)	0	x				x			x
-	136	Metcalfe (2006)	0			x		x		x	
-	148	D’Augelli and Hershberger (1993)	0.09	x					x		x
Residual Nodes Total				4	0	2	0	4	3	5	2
Grand total				127	14	12	37	64	51	105	48

be shaped by—attitudes toward members of other races or ethnicities. These articles appeared primarily in social psychology journals: *Group Processes & Intergroup Relations*, *Psychological Science*, *Journal of Experimental Social Psychology*, and *Personality and Social Psychology Bulletin*. One appears in *The Review of Higher Education*.

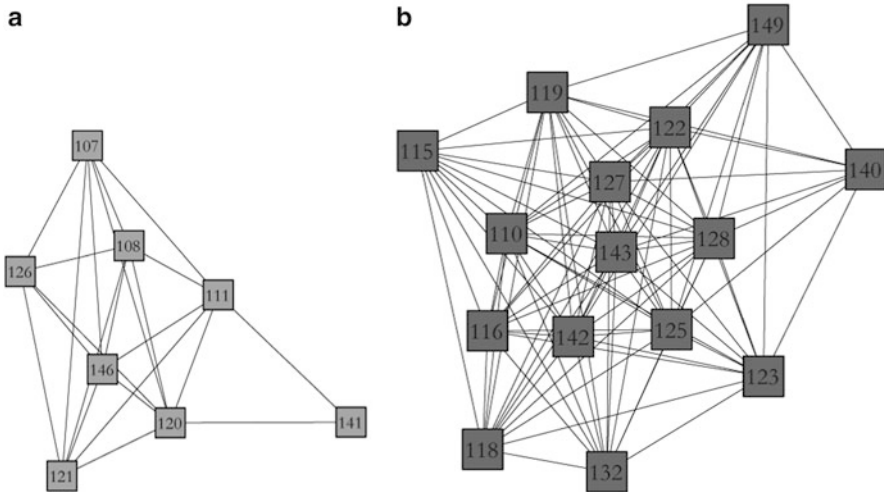


Fig. 4.4 (a) Cluster 2. Circles articles on faculty, squares articles on students (b) Cluster 3

Cluster 3, shown in dark gray in Fig. 4.4b, contains 15 articles, also exclusively student-focused. These articles also examine the role a roommate can play in shaping a student's experience of college; however, they all apply a peer-effects frame in their methodological approach. Rather than examining attitudes toward in-group and out-group members, this pocket of the literature asks what effect a roommate or classmate has on a student's GPA and other measures of achievement. Two articles in this cluster use peer effects to study outcomes other than achievement, including choice of major, drinking, drug use, and sexual behavior. By and large, these articles appeared in economics journals: *Journal of Public Economics*, *Journal of Labor Economics*, *Economic Inquiry*, *Review of Economics and Statistics*, *Quarterly Journal of Economics*, and the *Handbook of the Economics of Education*. A handful also appeared in education journals: *Sociology of Education*, *Research in Higher Education*, and the *Higher Education Data Sharing Consortium Conference*. One appeared in the *Journal of Abnormal Child Psychology*.

Cluster 1, shown in white in Fig. 4.5, is by far the largest. Of its 122 articles, 100 were identified as faculty-centered. These cover a range of disciplines: sociology, economics, management and organization studies, and science and information studies, as well as a few in political science, law, and education. Several methodological articles appeared in physics outlets. The journals best represented here include *Scientometrics*, *Research Policy*, *Journal of Informetrics*, *American Journal of Sociology*, *American Sociological Review*, *Social Studies of Science*, *Social Networks*, *Proceedings of the National Academy of Sciences*, and *Journal of the American Society for Information Science and Technology*.

Twenty-three articles in cluster 1 are identified as student-centered (one, Kossinets & Watts, 2009, is coded as both). Of these, many appear in sociology or social networks journals: *American Journal of Sociology*, *Social Networks*,

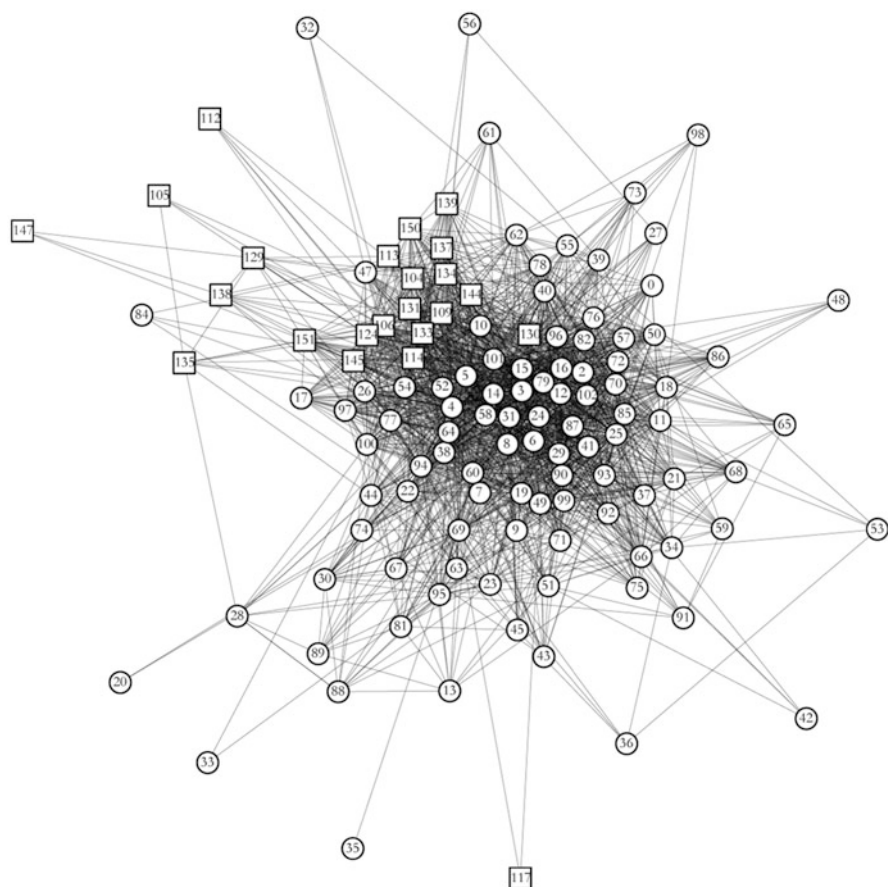


Fig. 4.5 Cluster 1. *Circles* articles on faculty, *squares* articles on students

Connections, *Academy of Management Journal*, and *Journal of Mathematical Sociology*. In addition, several appeared in the *Journal of Computer-Mediated Communication* and one in *British Journal of Educational Technology*. Several others appeared in education journals: *Studies in Higher Education*, *Social Psychology of Education*, and the *Journal of Higher Education*. Two were in economics journals: *Journal of Public Economics* and *Economics Letters*. Finally, the *American Journal of Community Psychology* and *Communication Education* had one each.

As cluster 1 is large, it could theoretically be decomposed into several subclusters, perhaps reflecting the variety of disciplinary traditions within it. However, even as a large cluster, it is fairly well connected. The density of a network is the ratio of the number of ties observed to the number of possible ties. The density of cluster

1 is 0.27, while that of the complete article network is 0.19. We have attempted to decompose cluster 1 into subcommunities, but we find that removing additional ties leads to plucking off individual nodes, one at a time. Thus, this cluster is characterized more by a core/periphery structure than by a subcommunity structure. It is also the most varied in the analytical categories associated with its articles. The majority of articles in this cluster use individuals as the network node; this is true for the complete network as well. Roughly, a third of the total in this cluster fall into each of the conceptual orientations: dependent, independent, and descriptive.

In contrast, clusters 2 and 3 share even higher rates of co-referencing; their densities are 0.79 and 0.89, respectively. Cluster 3 is composed entirely of articles that take individuals as their network nodes and that conceptualize the network as an independent variable. These observations are consistent with the peer-effects paradigm: individuals' ties to their peers are hypothesized to lead to changes in behavior, beliefs, achievement, or other outcomes. Cluster 2, which leans closer to the social psychology tradition, also contains only articles using individuals as the network nodes. In contrast to cluster 3, the articles in cluster 2 use a variety of conceptual orientations: descriptive, network as dependent variable, and network as independent variable.

After these analyses, the picture that emerges of the study of social networks in higher education is not that of a single coherent, mutually aware field of research. Rather, this area is balkanized. Those who study students fall into a few camps: a tight cluster primarily researching the development of students' attitudes toward race and ethnicity in college, and drawing on methods and framing from the field of social psychology; a second tight cluster drawing on methods and theories from economics, and studying the effects of roommates and classmates on achievement and other behaviors; and finally, a more loosely woven group, mainly in the sociology tradition, and to a lesser extent education, and including several publications in network-related specialty journals. Publications on faculty are similarly heterogeneous, spanning multiple fields and using a variety of methods and theories in their work.

While the smaller two clusters contain exclusively publications focused on students, cluster 1 contains a mix of student-focused and faculty-focused work. Interestingly, the student-focused work (the squares in the network diagram) lands overwhelmingly near clusters 2 and 3, indicating that these texts share references in common. These publications tend to come from one of four types of outlets: network specialty journals (*Social Networks* or *Connections*), higher education journals (*Journal of Higher Education* or *Studies in Higher Education*), communication journals (*Journal of Computer-Mediated Communication* or *Communication Education*), or general sociology journals. As such, they do not fit into either cluster 2 or 3, but they share references in common with them and in that sense form a bridge between the faculty-themed publications (many of which appear in network specialty journals or sociology journals and share references with these) and the student-themed work in other clusters. Clusters 2 and 3 remain separate because they do not share many of the references common within cluster 1; likely, they

are not frequently citing the sociology and SNA-specific literature. Here is a case where increased mutual awareness has the potential to better inform researchers across clusters.

Integrating Texts

We can gain further insight by examining the sets of references that hold these clusters together and those that link between them. Each of the clusters contains references to a few hundred or a few thousand publications. For the sake of simplicity, we have chosen those references with the highest betweenness within the cluster. Recall that betweenness of a node, v , is the fraction of shortest paths between two nodes, s and t , that pass through v , summed over all pairs of nodes in the graph. Thus, these references are the most central references, linking papers in the cluster; they are each research cluster’s core literature. Table 4.3 lists these core references.

Table 4.3 Highest betweenness titles referenced in each cluster

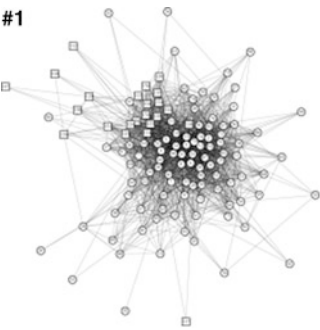
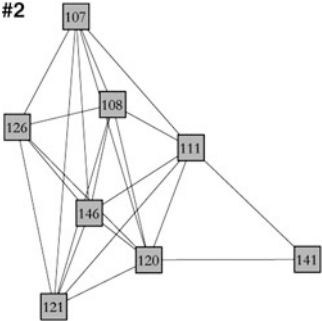
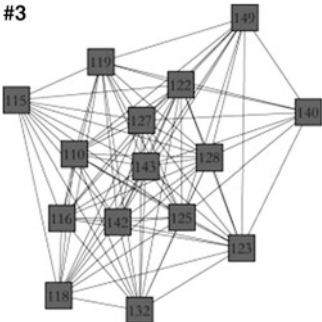
Cluster	Cite#	Title	Betweenness
<div>#1</div> 	1574	The strength of weak ties	32529.99
	4427	Social network analysis: Methods and applications	17991.44
	2266	Invisible colleges: Diffusion of knowledge in scientific communities	14552.51
	4502	What is research collaboration	14000.13
	3874	The structure of scientific collaboration networks	10407.81
	3270	The structure of a social science collaboration network: Disciplinary cohesion from 1963 to 1999	10172.28
	4775	Little science, big science	8598.43
	1582	Birds of a feather: Homophily in social networks	8497.42
	4282	The Matthew effect in science	7191.61
	3585	Structural holes: The social structure of competition	7030.58
	4996	Social capital in the creation of human capital	5177.59
	4391	The structure of scientific revolutions	4269.58
	4910	The increasing dominance of teams in production of knowledge	3245.47
	5080	Collaboration in an invisible college	3003.97
	4896	The sociology of science	2724.61

Table 4.3 (continued)

Cluster	Cite#	Title	Betweenness
	3827	Intergroup contact theory	99.92
	4992	The effect of university roommate contact on ethnic attitudes and behavior	36.65
	690	Generalized intergroup contact effects on prejudice	34.68
	4421	The nature of prejudice	34.68
	1997	The impact of college on students	34.19
	4495	Intergroup relations	24.79
	2502	The effects of in-group and out-group friendships on ethnic attitudes in college: A longitudinal study	17.26
	704	Roommate satisfaction and ethnic identity in mixed-race and white university roommate dyads	17.00
	4802	Reducing intergroup bias: The common in-group identity model	13.08
	1565	Beyond the contact hypothesis: Theoretical perspectives on desegregation	11.57
	981	Peer Effects with random assignment: Results for Dartmouth roommates	11.57
	5381	Peer effects in academic outcomes: Evidence from a natural experiment	11.21
	2328	Identification of endogenous social effects: The reflection problem.	10.79
	2397	Peer effects in higher education	9.23
	1133	Measuring peer group effects: A study of teenage behavior	9.23
	541	Competition between private and public schools, vouchers, and peer group effects	204.82
	1823	Does peer ability affect student achievement?	131.60
	5294	Peer effects on student achievement: Evidence from Chile	73.68
	4184	School-based peer effects and juvenile behavior	58.99
	3152	Peer effects in the classroom: Learning from gender and race variation	57.07

The references in Table 4.3 give a sense of the topics pursued in each cluster. Cluster 1 includes several references pertaining to science studies and in particular to studies of collaboration. In addition, there are several references to network methods and to broadly cited social network theory. Of the highly cited references from this cluster, two are publications included in this chapter: “The Increasing Dominance of Teams in Production of Knowledge” (Wuchty et al., 2007) and “Collaboration in an Invisible College” (Price & Beaver, 1966). Both are in cluster 1.

Cluster 2 shares citations to articles on prejudice, in-group/out-group bias, and on the effects roommates have on racial attitudes; these references closely reflect the themes discussed above for this cluster: adjustment to campus life, changes in racial attitudes, and roommate relationships. Two of these are included in this chapter: “The Effect of University Roommate Contact on Ethnic Attitudes and Behavior” (Van Laar et al., 2005) and “The Effects of In-group and Out-group Friendships on Ethnic Attitudes in College: A Longitudinal Study” (Levin et al., 2003). Both are in cluster 2.

Lastly, cluster 3 references articles on peer effects and especially peer effects in school settings. Of these, several are included in this chapter: “Peer Effects with Random Assignment: Results for Dartmouth Roommates” (Sacerdote, 2001), “Peer Effects in Academic Outcomes: Evidence from a Natural Experiment” (Zimmerman, 2003), and “Peer Effects in Higher Education” (Winston & Zimmerman, 2004). All are in cluster 3.

All three clusters contain references to articles within the cluster, indicating that scholars within the field are citing each other; the rate of such citations is higher in clusters 2 and 3 than in cluster 1. There is little indication, however, that authors cite those in other clusters: the field as a whole does not show mutual awareness of each other, outside of topical clusters.

Whereas Table 4.3 listed the reference shared within each cluster, we are also interested in the references that span across clusters. These are shown in Fig. 4.6. In the overlap between clusters, we see evidence of a small amount of citation across clusters as well as of topical intersection between clusters. However, the scale of this overlap is quite small. In total, 25 references are cited by more than one cluster, out of over 5,000 references in the complete network. No single reference is shared among all three clusters. Clusters 2 and 3 share only one reference in common: “The General Nature of Peer Group Influence,” written in 1966 by Theodore Newcomb. Although Newcomb was a psychologist, his work has clearly influenced economics as well and is a classic text in the area. Clusters 1 and 2 share ten references in common. These include two from cluster 2: “The Effect of University Roommate Contact on Ethnic Attitudes and Behavior” (Van Laar et al., 2005) and “The Effects of In-group and Out-group Friendships on Ethnic Attitudes in College: A Longitudinal Study” (Levin et al., 2003). Three are classic works of social psychology: “Social Pressures in Informal Groups: A Study of Human Factors in Housing” (Festinger, 1963), “The Impact of College upon Political Knowledge, Participation, and Values” (McClintock & Turner, 1962), and “A Theory of Cognitive Dissonance” (Festinger, 1957). In addition, “Birds of a Feather: Homophily in Social Networks” (McPherson et al., 2001) has been highly influential

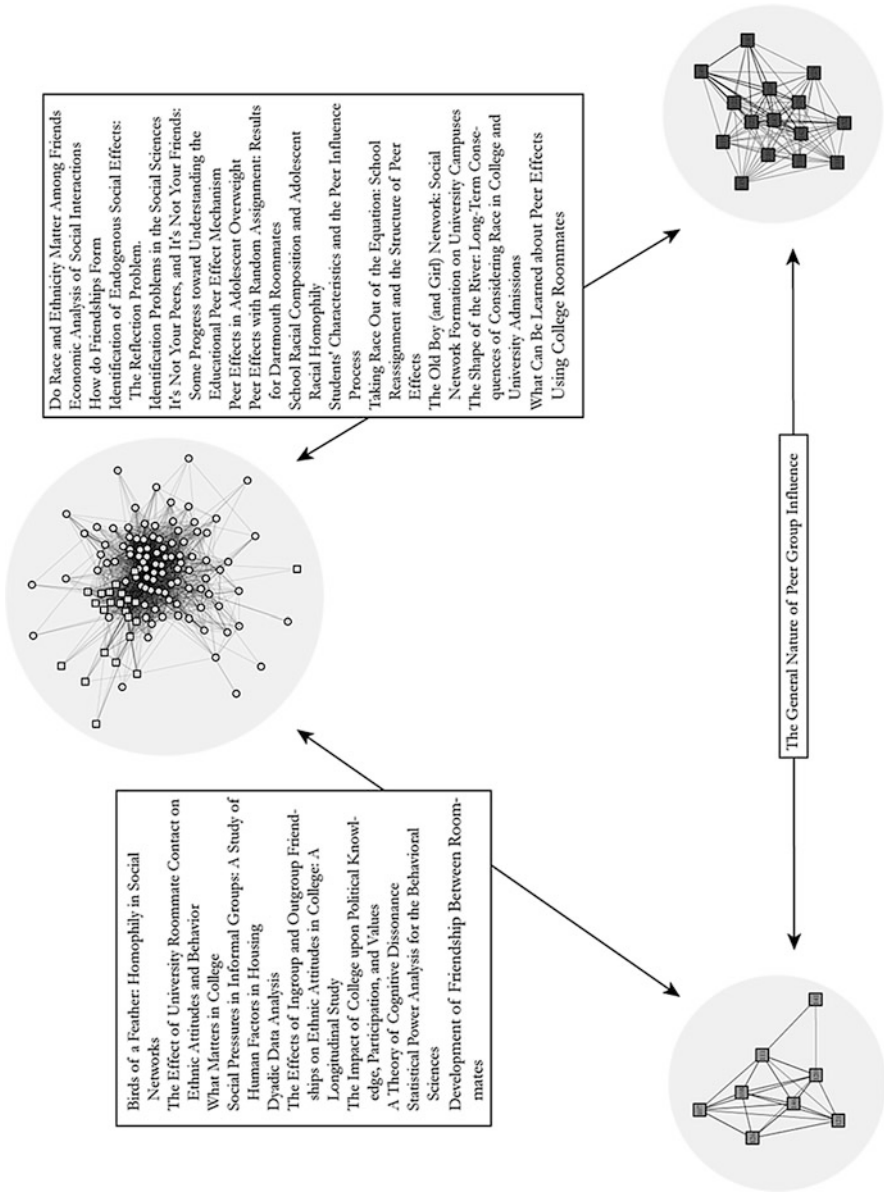


Fig. 4.6 Reference overlap between clusters

among social networks researchers, while *Dyadic Data Analysis* (Kenny et al., 2006) and *Statistical Power Analysis for the Behavioral Sciences* (Cohen, 1988) are methodological publications.

Clusters 1 and 3 share 14 references in common. Of these, four are articles in cluster 3: “It’s Not Your Peers, and It’s Not Your Friends: Some Progress toward Understanding the Educational Peer Effect Mechanism” (Foster, 2006), “Peer Effects with Random Assignment: Results for Dartmouth Roommates” (Sacerdote, 2001), “The Old Boy (and Girl) Network: Social Network Formation on University Campuses” (Mayer & Puller, 2008), and “What Can Be Learned about Peer Effects Using College Roommates?” (Stinebrickner & Stinebrickner, 2006). Other articles include those on peer effects, on the racial composition of schools, and on friendship formation. Interestingly, publications in cluster 1 cite those in cluster 3, but the converse is not true. This suggests that the student-themed texts included in cluster 1 show some awareness of the peer-effects literature, but the peer-effects literature does not cite works from sociology or social networks journals.

We also examined whether any of the texts included in the review cite one another. This network is sparser than the co-referencing network, but there are points of connection. In total, we found 119 cases of citation. The 122 publications in cluster 1 cite a total of 102 unique publications in the review. Of these, 59 are in cluster 1, two are in cluster 2, three are in cluster 3, 4 are among the unclustered nodes in the network (shown in gray), and 34 are references to publications not included in the network analysis. The eight texts in cluster 2 make a total of six citations to publications in the review; of these, five are to texts in cluster 2, and the last is to an unclustered text. The 15 texts in cluster 3 make 11 citations to publications in the review. Of these, ten are from cluster 3, and the last is from cluster 1 (Mayer & Puller, 2008 was cited by Fletcher & Tienda, 2009). Thus, as with the cross cluster co-referencing patterns, we see that texts in cluster 1 show awareness of the literature in clusters 2 and 3 (albeit, limited), while clusters 2 and 3 do not reciprocate (with the exception on one citation). However, there is evidence of within-cluster awareness.

Empirical Summary

From our empirical analyses of the higher education social network corpus, we observe a variety of ways the literature is used and organized by scholars. First, we clearly observe that this is not a collaborating community of researchers, but rather a loose set of related research topics. Second, we observe that the area is characterized by distinct thought styles: a social psychological focus on student diversity, an economics focus on student peer influence, and a sociological/sociology-of-science effort to study universities. Each of these thought styles has cogency in that it relies on many of the same texts. The social psychological texts share common ground in their theories and experiments of group processes, the economics texts rely on their own subfield’s literature, and the texts on sociology of college students and faculty seem more heterogeneous and regard student-faculty literatures as somewhat related. Third, we observe that these research endeavors do have some interrelation,

albeit only piecemeal. The mixed faculty/student cluster seems to reference work more widely and reaches into the social psychological and economics clusters, drawing on works salient to those fields. However, neither of the disciplinary efforts (clusters 2 and 3) on student diversity and peer influence seem to draw upon related literatures or those outside their respective fields. In effect, they are insular in spite of sharing a concern with similar analytic dimensions.

Conclusion

In this chapter, we have interrogated the literature that applies social network analysis to the study of higher education from several angles. We began by slicing it along three analytic dimensions of interest: the network boundary or population studied (student or faculty), the actor or unit of analysis (individuals, teams, or organizations), and the type of research question asked (descriptive, network as independent variable, network as dependent variable). These dimensions revealed the most common approaches used to date and where gaps exist in the current literature. We also summarized which findings are consistent and well established, as well as those that remain controversial.

We followed this by applying social network analytical methods to our own data, generating a network image of the literature, and partitioning it into clusters. We find two smaller, more homogeneous clusters and a third larger, more heterogeneous cluster. These clusters break down along disciplinary and topical lines, but not perfectly so, with one taking a social psychological approach, one economics, and one centered around sociology, but with strands from many disciplines woven in. We find that each cluster cites papers within itself, and we find papers share references across clusters, but at a limited rate.

This area of research will likely grow in the near future. Several factors combine to make this a watershed moment for the study of social networks in higher education: the availability of data; the development of new network-based methods, which make it more feasible to analyze large and longitudinal network datasets; and heightened interest in the work of colleges and universities in the current political and social climate demanding accountability.

Multifaceted network studies of universities are upon us. Expansive, rich records afford a far more detailed view of university life that includes faculty, students, and staff as well as their interactions. Accounting techniques of each expended dollar illustrate who pays for whom; affiliation records in the registrar's office provide views on course-taking, advising, and many aspects of the training experience in network form; ISI Web of Knowledge, Google Scholar, the US Patent and Trade Office, and public databases from NIH and NSF afford views on coauthoring, co-granting, and citation. Online social networks and e-mail corpora can provide a minute-by-minute picture of (some types of) social interactions and have the potential to include all members of the university ecosystem. Cell phone datasets, like the Reality Mining Dataset currently being collected at MIT, offer an even

more detailed view into interpersonal contact and interactions (Eagle & Pentland (Sandy), 2006).

Facilitating the analysis of these streams, new methods are developing, making it easier to collect, organize, and analyze large datasets. Exponential Random Graph Models (ERGMs) use simulations to allow statistical inference about network properties (Robins, Pattison, Kalish, & Lusher, 2006). Wimmer and Lewis (2010) offer a compelling example of the use of ERGMs to study friendship formation among college students. Like ERGMs, SIENA models also rely on simulations, but they are tailored for longitudinal network data, allowing inferences about the development of social processes over time (Snijders, 2005). Both of these approaches enable scholars to model networks as independent and dependent variables and to disentangle factors of selection (features of individuals) from influence (features of relations). For very large-scale networks, data mining offers several algorithms that facilitate analysis of datasets too large to hold in a computer's memory. Moreover, as the field matures, we expect growing consensus about methods and central questions as well as increased mutual awareness among researchers in different clusters.

Concurrently, we believe that broader social trends make the study of networks in higher education ever more relevant. Colleges and universities are subject to increasing calls for accountability—both in terms of student outcomes and in terms of resources devoted to research. Social networks of students, faculty, and other university stakeholders provide useful information for assessing the student training experience, faculty work life, and the role that policy and administrative decisions may play in shaping these. Similarly, social networks play a vital role in initiatives to promote and to assess interdisciplinarity; as interest in interdisciplinary collaborations waxes, network analysis can shed light on the mechanisms through which faculty members and students can work together across departments and disciplines.

Social network analysis will be most useful if it demonstrates what sorts of questions it can answer. Currently, it focuses on describing patterns of association among certain types of university personnel, modeling the emergence of such ties among them, or interpreting their influence on certain outcomes. These areas would do well to look to the literature and advancing methods in social network analysis. The larger field of SNA has a long history of richly descriptive cases, while those in higher education are piecemeal and lack the breadth and depth that would inform sophisticated quantitative efforts.

Most important, network analysis represents an alternative to methodologically individualistic approaches to studying higher education institutions. At the least, network constructs can augment many current research efforts in higher education—as yet another variable, but now a “social” one, salient to the research questions of interest in this field. More significantly, it represents a frame shift in how we regard educational institutions. Instead of aggregates of actors, they are systems of interrelation. Higher education institutions are woven fabrics, layered and patched together in a complex arrangement. By discerning their structure and the processes by which participants move within them, we gain a more intuitive, realistic understanding for how they are lived. Nearly every process of education entails relationships and interactions. Certainly, the development of minds and identities is also central, but they are

often a product of our associations. Network analysis affords a distinct window peering into the landscape of higher education we all know and experience.

As research in social networks and higher education proceeds, we see several lines along which it can improve. First, the research modeling faculty and student relations as a dependent variable should rely more heavily on recent advances in sociology—such as ERGM and SIENA models—explicitly developed to model network formation. The current higher education efforts focus overwhelmingly on preference and opportunity concerns, such as homophily and propinquity, which inhere in the dyad, when other higher-order mechanisms are often relevant. For example, are networks in colleges as hierarchical as those in grade school? Are they closed relations or expanding groups? How is popularity generated, in network terms, and how do networks of different types of relations (e.g., friendship versus residential connections, versus club and sports affiliations, or research collaboration versus committee service and neighboring faculty offices) map onto and mutually shape one another?

Research predicting social networks would also benefit from a wider consideration of contextual effects. For example, do course curricula, course composition, and even grading conventions have an effect on student network formation? Do departmental compositions, tenure rates, and teaching loads influence faculty collaborations with one another? What contextual factors lead networks to polarize, stratify, or fall apart? In much of the education literature on networks, there is little concern with context, when it is clear that context can establish conditions that amplify or dampen various network formation mechanisms. Scholars can readily accomplish contextual analysis by collecting data on multiple networks (schools or classrooms), modeling their networks as a dependent variable (e.g., ERGMs), and then analyzing the coefficients and standard errors using meta-analysis in a multilevel framework. There, one can assess which contextual features moderate network mechanisms, leading some university settings to assume certain macrostructural forms.

With a more expanded understanding of network formation mechanisms, we can begin to ask and answer larger questions. For example, how do we relate the characterizations of college student networks to those commonly observed in adolescence (Cotterell, 2007)? Is there a network career and shifting form of peer relations that follows a developmental process into adulthood? And what is a beneficial peer network for youth at different life stages? Is it healthy for students to belong to a tightly knit clique, to bridge between multiple peer groups, or to have a wide and diffuse peer group? Are there implications for students with different types of social networks in making the transition to college, in feeling well adjusted there, and in achieving their goals?

Interethnic contact is a popular area of inquiry in this review, but many unanswered questions remain: what proportions of races in a dorm and what configurations of rooming groups optimize interracial contact and shared understanding? How do contextual features moderate our findings? Is the tie-formation process influenced differently by an elective theme dorm versus a random-assignment generic dorm? Moreover, because many colleges and universities assign freshman roommates at random, there is much potential to continue to learn through randomized experiments. The literature on college friendship diversity and its effects would benefit by relying more on recent techniques for modeling peer influence that can be found in

economics and sociology (Aral et al., 2009; Cohen-Cole & Fletcher, 2008). These efforts take into account both selection (using matching methods) and autocorrelation (the fact that errors are correlated across interdependent actors). Using them, one can more conclusively answer questions like the following: what do college students gain from having diverse friends?

Novel areas of inquiry remain. Student health is a prime concern on college campuses. We have reviewed the limited literature examining peer effects in drinking and drug use. How might other network-based modes of inquiry inform this research? Habits around drug and alcohol use are often spread through diffusion processes: how many friends who drink (or avoid drinking) must a student have before their own behavior changes? Does it matter through which channels the friendships formed (e.g., course-based friendships or dorms and extracurriculars)? Does the student's network position (more central, more peripheral, spanning two disjoint groups) matter? Similar questions can be asked of other important social issues on campus, from healthful eating habits to patterns of sexual activity: how are STDs spread on campus? Is there evidence of a "contagion" effect in behaviors of concern?

We have discussed the university as a site of research and knowledge creation and as a site of student education. The university has a third, very important role today: that of providing service to society. Institutions of higher education train future leaders, professionals, and the educated citizenry, and they conduct research that is often tailored to address the world's pressing problems. Yet the fate of this knowledge and of these educated individuals once they leave the institution is rarely examined. We have evidence, for example, that the college years can shape student political beliefs. What happens to these beliefs when students graduate? Are there network effects that support the maintenance of beliefs or others that challenge them? When does a graduate's social network prod her to become politically involved or prompt her to enter the fray of the national conversation on politics and policy?

We have argued throughout this review that universities are collections of relations, and they are. Education has always been a relational—an interactive—task, and research today is increasingly so. Few of the functions of institutions of higher education can be conducted by lone individuals, working in isolation. These activities—teaching, learning, researching, studying, and even just making friends—can be better understood by adopting a relational perspective, in addition to the individualistic perspectives already used in the field. We have attempted here to review and summarize the body of work that does so, to glean its highlights, and to illuminate its recesses in order to provide a roadmap—one showing where the field has been and where we hope it might go.

References

- Acedo, F. J., Barroso, C., Casanueva, C., & Galán, J. L. (2006). Co-authorship in management and organizational studies: An empirical and network analysis. *Journal of Management Studies*, 43(5), 957–983.
- Adams, J. D., Black, G. C., Clemmons, J. R., & Stephan, P. E. (2005). Scientific teams and institutional collaborations: Evidence from U.S. universities, 1981–1999. *Research Policy*, 34(3), 259–285.

- Agrawal, A. K., & Goldfarb, A. (2006). *Restructuring research: Communication costs and the democratization of university innovation* (Working Paper No. 12812). Retrieved from National Bureau of Economic Research website: <http://www.nber.org/papers/w12812>
- Andrews, J. E. (2003). An author co-citation analysis of medical informatics. *Journal of the Medical Library Association*, 91(1), 47–56.
- Antonio, A. L. (2001). Diversity and the influence of friendship groups in college. *The Review of Higher Education*, 25(1), 63–89.
- Antrobus, J. S. (1988). Social networks and college success, or grade point average and the friendly connection. In S. Salzinger, J. Antrobus, & M. Hammer (Eds.), *Social networks of children, adolescents and college students* (pp. 227–246). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Aral, S., Muchnik, L., & Sundararajan, A. (2009). Distinguishing influence-based contagion from homophily-driven diffusion in dynamic networks. *Proceedings of the National Academy of Sciences of the United States of America*, 105(51), 21544–21549.
- Arcidiacono, P., & Nicholson, S. (2005). Peer effects in medical school. *Journal of Public Economics*, 89, 327–350.
- Audretsch, D. B., & Stephan, P. E. (1996). Company-scientist locational links: The case of biotechnology. *American Economic Review*, 86(3), 641–652.
- Azoulay, P., Graff Zivin, J. S., & Wang, J. (2010). Superstar extinction. *Quarterly Journal of Economics*, 125(2), 549–589.
- Babchuk, N., Keith, B., & Peters, G. (1999). Collaboration in sociology and other scientific disciplines: A comparative trend analysis of scholarship in the social, physical, and mathematical sciences. *The American Sociologist*, 30(3), 5–21.
- Baker, S., Mayer, A., & Puller, S. L. (2011). Do more diverse environments increase the diversity of subsequent interaction? Evidence from random dorm assignment. *Economics Letters*, 110, 110–112.
- Balconi, M., Breschi, S., & Lissoni, F. (2004). Networks of inventors and the role of academia: an exploration of Italian patent data. *Research Policy*, 33(1), 127–145.
- Baldwin, T. T., Bedell, M. D., & Johnson, J. L. (1997). The social fabric of a team-based M.B.A. program: Network effects on student satisfaction and performance. *Academy of Management Journal*, 40(6), 1369–1397.
- Barabasi, A. L., Jeong, H., Neda, Z., Ravasz, E., Schubert, A., & Vicsek, T. (2002). Evolution of the social network of scientific collaboration. *Physica A*, 311, 590–614.
- Barnett, G. A., & Wu, R. Y. (1995). The international student exchange network: 1970 & 1989. *Higher Education*, 30, 353–368.
- Borgman, C. L., & Furner, J. (2002). Scholarly communication and bibliometrics. *Annual Review of Information Science and Technology*, 36, 3–72.
- Borner, K., Dall'Asta, L., Ke, W., & Vespignani, A. (2005). Studying the emerging global brain: Analyzing and visualizing the impact of co-authorship teams. *Complexity*, 10(4), 57–67.
- Bozeman, B., & Corley, E. (2004). Scientists' collaboration strategies: implications for scientific and technical human capital. *Research Policy*, 33(4), 599–616.
- Breiger, R. L. (1976). Career attributes and network structure: A blockmodel study of a biomedical research specialty. *American Sociological Review*, 41(1), 117–135.
- Brewer, D. D., & Webster, C. M. (1999). Forgetting of friends and its effects on measuring friendship networks. *Social Networks*, 21, 361–373.
- Brunello, G., De Paola, M., & Scoppa, V. (2010). Peer effects in higher education: Does the field of study matter? *Economic Inquiry*, 48(3), 621–634.
- Burris, V. (2004). The academic caste system: Prestige hierarchies in Ph.D. exchange networks. *American Sociological Review*, 69(2), 239–264.
- Burt, R. S. (2001). Attachment, decay, and social network. *Journal of Organizational Behavior*, 22, 619–643.
- Carolan, B. V. (2008). The structure of educational research: The role of multivocality in promoting cohesion in an article interlock network. *Social Networks*, 30(1), 69–82.
- Carrell, S. E., Fullerton, R. L., & West, J. E. (2009). Does your cohort matter? Measuring peer effects in college achievement. *Journal of Labor Economics*, 27(3), 439–463.

- Centola, D. (2010). The spread of behavior in an online social network experiment. *Science*, 329, 1194–1197.
- Centola, D. (2011). An experimental study of homophily in the adoption of health behavior. *Science*, 334(6060), 1269–72.
- Chen, T.-M., & Barnett, G. A. (2000). Research on international student flows from a macro perspective: A network analysis of 1985, 1989 and 1995. *Higher Education*, 39, 435–453.
- Clark, B. Y. (2010). The effects of government, academic and industrial policy on cross-university collaboration. *Science and Public Policy*, 37(5), 314–330.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum.
- Cohen-Cole, E., & Fletcher, J. M. (2008). Detecting the implausible social network effects in acne, height, and headaches: A longitudinal analysis. *British Medical Journal*, 337, 2533–2537.
- Cotterell, J. (2007). *Social networks in youth and adolescence*. Hove, UK: Routledge.
- Cottrill, C. A., Rogers, E. M., & Mills, T. (1989). Co-citation analysis of the scientific literature of innovation research traditions: Diffusion of innovations and technology transfer. *Science Communication*, 11(2), 181–208.
- Crane, D. (1969). Social structure in a group of scientists: A test of the “Invisible College” hypothesis. *American Sociological Review*, 34(3), 335–352.
- Csardi, G., & Nepusz, T. (2006). The igraph software package for complex network research. *International Journal of Complex Systems*, 1695, 38.
- Culnan, M. J. (1986). The intellectual development of management information systems, 1972–1982: A co-citation analysis. *Management Science*, 32(2), 156–172.
- Culnan, M. J. (1987). Mapping the intellectual structure of MIS, 1980–1985: A co-citation analysis. *MIS Quarterly*, 11(3), 341–353.
- Cummings, J. N., & Kiesler, S. (2008, November 8–12). Who collaborates successfully? Prior experience reduces collaboration barriers in distributed interdisciplinary research. In B. Begole & D. W. McDonald (Eds.), *Proceedings of the ACM conference on Computer Supported Cooperative Work (CSCW'08)* (pp. 437–446). San Diego, CA: ACM Press.
- Dahlander, L., & McFarland, D. A. (2013). Ties that Last: Tie formation and persistence in research collaborations over time.
- Dawson, S. (2010). “Seeing” the learning community: An exploration of the development of a resource for monitoring online student networking. *British Journal of Educational Technology*, 41(5), 736–752.
- De Stefano, D., Giordano, G., & Vitale, M. P. (2011). Issues in the analysis of co-authorship networks. *Quality and Quantity*, 45(5), 1091–1107.
- De Stefano, D., Vitale, M. P., & Zaccarin, S. (2010, June 16–18). The scientific collaboration network of Italian academic statisticians. In *45th scientific meeting of the Italian Statistical Society* (pp. 1–8). Padua, Italy: University of Padua.
- DeFour, D. C., & Hirsch, B. J. (1990). The adaptation of black graduate students: A social network approach. *American Journal of Community Psychology*, 18(3), 487–503.
- Desmedt, E., & Valcke, M. (2004). Mapping the learning styles “jungle”: An overview of the literature based on citation analysis. *Educational Psychology*, 24(4), 445–464.
- Dietz, J. S., & Bozeman, B. (2005). Academic careers, patents, and productivity: Industry experience as scientific and technical human capital. *Research Policy*, 34(3), 349–367.
- Ding, W. W., Levin, S. G., Stephan, P. E., & Winkler, A. E. (2010). The impact of information technology on academic scientists’ productivity and collaboration patterns. *Management Science*, 56(9), 1439–1461.
- Ding, Y. (2011). Scientific collaboration and endorsement: Network analysis of coauthorship and citation networks. *Journal of Informetrics*, 5(1), 187–203.
- Ding, Y., Chowdhury, G., & Foo, S. (1999). Mapping the intellectual structure of information retrieval studies: an author co-citation analysis, 1987–1997. *Journal of Information Science*, 25(1), 67–78.
- Ducor, P. (2000). Coauthorship and coinventorship. *Science*, 289(5481), 873–875.

- Duncan, G. J., Boisjoly, J., Kremer, M., Levy, D. M., & Eccles, J. (2005). Peer effects in drug use and sex among college students. *Journal of Abnormal Child Psychology*, 33(3), 375–385.
- Durbach, I. N., Naidoo, D., & Mouton, J. (2008). Co-authorship networks in South African chemistry and mathematics. *South African Journal of Science*, 104, 487–492.
- Durrington, V. A., Repman, J., & Valente, T. W. (2000). Using social network analysis to examine the time of adoption of computer-related services among university faculty. *Journal of Research on Computing in Education*, 33(1), 16–27.
- D’Augelli, A. R., & Herschberger, S. L. (1993). African American undergraduates on a predominantly white campus: Academic factors, social networks, and campus climate. *The Journal of Negro Education*, 62(1), 67–81.
- Eagle, N., & Pentland (Sandy), A. (2006). Reality mining: Sensing complex social systems. *Personal and Ubiquitous Computing*, 10(4), 255–268.
- Ebadi, Y. M., & Utterback, J. M. (1984). The effects of communication on technological innovation. *Management Science*, 30(5), 572–585.
- Edelman, P., & George, T. (2007). Six degrees of Cass Sunstein. *The Green Bag*, 11(1), 19–36.
- Ellis, D., Allen, D., & Wilson, T. (1999). Information science and information systems: Conjoint subjects disjunct disciplines. *Journal of the American Society for Information Science*, 50(12), 1095–1107.
- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook “friends:” Social capital and college students’ use of online social network sites. *Journal of Computer-Mediated Communication*, 12(4), 1143–1168.
- Evans, J. A. (2010a). Industry collaboration, scientific sharing, and the dissemination of knowledge. *Social Studies of Science*, 40(5), 757–791.
- Evans, J. A. (2010b). Industry induces academic science to know less about more. *The American Journal of Sociology*, 116(2), 389–452.
- Evans, S., Lambiotte, R., & Panzarasa, P. (2011). Community structure and patterns of scientific collaboration in business and management. *Scientometrics*, 89(1), 381–396.
- Festinger, L. (1957). *Theory of cognitive dissonance*. Evanston, IL: Row, Peterson.
- Festinger, L. (1963). *Social pressures in informal groups: A study of human factors in housing*. Stanford, CA: Stanford University Press.
- Festinger, L., Schachter, S., & Back, K. (1950). *Social pressures in informal groups*. Stanford, CA: Stanford University Press.
- Fleck, L. (1981). *The genesis and development of a scientific fact* (F. Bradley & T. J. Trenn, Trans.). Chicago: University of Chicago Press. (Original work published in 1935)
- Fletcher, J. M., & Tienda, M. (2009). High school classmates and college success. *Sociology of Education*, 82, 287–314.
- Fontana, R., Geuna, A., & Matt, M. (2006). Factors affecting university–industry R&D projects: The importance of searching, screening and signaling. *Research Policy*, 35(2), 309–323.
- Foster, G. (2006). It’s not your peers, and it’s not your friends: Some progress toward understanding the educational peer effect mechanism. *Journal of Public Economics*, 90(8–9), 1455–1475.
- Franceschet, M. (2011). Collaboration in computer science: A network science approach. *Journal of the American Society for Information Science and Technology*, 62(10), 1992–2012.
- Franceschet, M., & Costantini, A. (2010). The effect of scholar collaboration on impact and quality of academic papers. *Journal of Informetrics*, 4(4), 540–553.
- Friedkin, N. (1978). University social structure and social networks among scientists. *The American Journal of Sociology*, 83(6), 1444–1465.
- Friedkin, N. (1980). A test of structural features of Granovetter’s Strength of Weak Ties theory. *Social Networks*, 2, 411–422.
- Girvan, M., & Newman, M. E. J. (2002). Community structure in social and biological networks. *Proceedings of the National Academy of Sciences of the United States of America*, 99(12), 7821–6.
- Glänzel, W. (2002). Coauthorship patterns and trends in the sciences (1980–1998): A bibliometric study with implications for database indexing and search strategies. *Library Trends*, 50(3), 461–473.

- Glänzel, W., & Schubert, A. (2004). Analyzing scientific networks through co-authorship. In: H.F.M. Moed, W. Glänzel, & U. Schmoch (Eds.), *Handbook of quantitative science and technology research* (pp. 257–276). Dordrecht: Kluwer Academic Publishers.
- Glänzel, W., & Schubert, A. (2005). Analysing scientific networks through co-authorship. In H. Moed, W. Glänzel, & U. Schmoch (Eds.), *Handbook of quantitative science and technology research* (pp. 257–276). Leiden, The Netherlands: Springer.
- Godley, J. (2008). Preference or propinquity? The relative contribution of selection and opportunity to friendship homophily in college. *Connections*, 1, 65–80.
- Gossart, C., & Özman, M. (2008). Co-authorship networks in social sciences: The case of Turkey. *Scientometrics*, 78(2), 323–345.
- Gregoire, D. A., Noel, M. X., Dery, R., & Bechard, J.-P. (2006). Is there conceptual convergence in entrepreneurship research? A co-citation analysis of frontiers of entrepreneurship research, 1981–2004. *Entrepreneurship Theory and Practice*, 30(3), 333–373.
- Guimerà, R., Uzzi, B., Spiro, J., & Amaral, L. A. N. (2005). Team assembly mechanisms determine collaboration network structure and team performance. *Science (New York, N Y)*, 308(5722), 697–702.
- Gulbrandsen, M., & Smeby, J.-C. (2005). Industry funding and university professors' research performance. *Research Policy*, 34(6), 932–950.
- Hadani, M., Coombes, S., Das, D., & Jalajas, D. (2011). Finding a good job: Academic network centrality and early occupational outcomes in management academia. *Journal of Organizational Behavior*, 33(5), 723–739.
- Han, S.-K. (2003). Tribal regimes in academia: A comparative analysis of market structure across disciplines. *Social Networks*, 25(3), 251–280.
- Hargens, L. L. (2000). Using the literature: Reference networks, reference contexts, and the social structure of scholarship. *American Sociological Review*, 65(6), 846–865.
- Hargittai, E. (2008). Whose space? Differences among users and non-users of social network sites. *Journal of Computer-Mediated Communication*, 13, 276–297.
- Hasan, S., & Bagde, S. (2012). *Social capital, caste, and academic performance: Evidence from randomly assigned roommates in an Indian college* (Stanford University, Paper Under Review).
- Haslam, N., & Laham, S. (2009). Early-career scientific achievement and patterns of authorship: The mixed blessings of publication leadership and collaboration. *Research Evaluation*, 18(5), 405–410.
- Hayashi, T. (2003). Effect of R&D programmes on the formation of university–industry–government networks: Comparative analysis of Japanese R&D programmes. *Research Policy*, 32(8), 1421–1442.
- He, B., Ding, Y., & Ni, C. (2011). Mining enriched contextual information of scientific collaboration: A meso perspective. *Journal of the American Society for Information Science*, 62(5), 831–845.
- He, Z.-L. (2009). International collaboration does not have greater epistemic authority. *Journal of the American Society for Information Science and Technology*, 60(10), 2151–2164.
- Heinze, T., & Bauer, G. (2007). Characterizing creative scientists in nano-S&T: Productivity, multidisciplinaryity, and network brokerage in a longitudinal perspective. *Scientometrics*, 70(3), 811–830.
- Hellsten, I., Lambiotte, R., Scharnhorst, A., & Ausloos, M. (2007). Self-citations, co-authorships and keywords: A new approach to scientists' field mobility? *Scientometrics*, 72(3), 469–486.
- Hoel, J., Parker, J., & Rivenburg, J. (2005, January 14). *Peer effects: Do first-year classmates, roommates, and dormmates affect students' academic success*. Higher education data sharing consortium winter conference, Santa Fe, NM.
- Hou, H., Kretschmer, H., & Liu, Z. (2008). The structure of scientific collaboration networks in Scientometrics. *Scientometrics*, 75(2), 189–202.
- Hunter, L., & Leahey, E. (2008). Collaborative research in sociology: Trends and contributing factors. *The American Sociologist*, 39(4), 290–306.
- Johnson, B., & Oppenheim, C. (2007). How socially connected are citers to those that they cite? *Journal of Documentation*, 63(5), 609–637.

- Johri, N., Ramage, D., McFarland, D. A., & Jurafsky, D. (2011, June 24). A study of academic collaboration in computational linguistics with latent mixtures of authors. In *Proceedings of the 5th ACL-HLT workshop on language technology for cultural heritage, social sciences, and humanities* (pp. 124–132). Portland, OR: Association for Computational Linguistics.
- Jo, S. J., Jeung, C.-W., Park, S., & Yoon, H. J. (2009). Who is citing whom: Citation network analysis among HRD publications from 1990 to 2007. *Human Development Quarterly*, 20(4), 503–537.
- Jones, B. F., Wuchty, S., & Uzzi, B. (2008). Multi-university research teams: Shifting impact, geography, and stratification in science. *Science*, 322, 1259–1262.
- Karki, R. (1996). Searching for bridges between disciplines: An author co-citation analysis on the research into scholarly communication. *Journal of Information Science*, 22(5), 323.
- Katz, J. S., & Hicks, D. (1997). How much is a collaboration worth? A calibrated bibliometric model. *Scientometrics*, 40(3), 541–554.
- Kenny, M., & Stryker, S. (1994). Social network characteristics of white, African-American, Asian, and Latino/a college students and college adjustment: A longitudinal study. In *102nd annual meeting of the American Psychological Association*, Los Angeles, CA, USA.
- Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis*. New York: The Guilford Press.
- Kezar, A. (2005). Redesigning for collaboration within higher education institutions: An exploration into the developmental process. *Research in Higher Education*, 46(7), 831–860.
- Kim, J. W. (2009). The structural change of Korean sociological academic community. *Korean Journal of Sociology*, 43(6), 45–72.
- Knoke, D., & Yang, S. (2008). *Social network analysis* (2nd ed.). Thousand Oaks, CA: Sage Publications.
- Kossinets, G., & Watts, D. J. (2009). Origins of homophily in an evolving social network. *The American Journal of Sociology*, 115(2), 405–450.
- Kraatz, M. S. (1998). Learning by association? Interorganizational networks and adaptation to environmental change. *Academy of Management Journal*, 41(6), 621–643.
- Kretschmer, H. (2004). Author productivity and geodesic distance in bibliographic co-authorship networks, and visibility on the web. *Scientometrics*, 60(3), 409–420.
- Kreuzman, H. (2001). A co-citation analysis of representative authors in philosophy: Examining the relationship between epistemologists and philosophers of science. *Scientometrics*, 51(3), 525–539.
- Kronegger, L., Ferligoj, A., & Doreian, P. (2011). On the dynamics of national scientific systems. *Quality and Quantity*, 45(5), 989–1015.
- Laband, D. N., & Tollison, R. D. (2000). Intellectual collaboration. *Journal of Political Economy*, 108(3), 632–662.
- Lambiotte, R., & Panzarasa, P. (2009). Communities, knowledge creation, and information diffusion. *Journal of Informetrics*, 3, 180–190.
- Lampe, C., Ellison, N., & Steinfield, C. (2006, November 4–8). A face(book) in the crowd: Social searching vs. social browsing. In *Proceedings of the ACM conference on Computer Supported Cooperative Work (CSCW'06)* (pp. 167–170). Banff, AB, Canada: ACM Press.
- Lampe, C., Ellison, N., & Steinfield, C. (2007, April 28–May 3). A familiar face(book): Profile elements as signals in an online social network. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 435–444). San Jose, CA, USA: ACM Press.
- Larivière, V., Gingras, Y., & Archambault, E. (2006). Canadian collaboration networks: A comparative analysis of the natural sciences, social sciences and the humanities. *Scientometrics*, 68(3), 519–533.
- Laumann, E., Marsden, P., & Prensky, D. (1983). The boundary specification problem in network analysis. In L. C. Freeman, D. R. White, & A. K. Romney (Eds.), *Research methods in social network analysis* (pp. 61–88). London: Sage Publications.
- Lazega, E., Jourda, M.-T., Mounier, L., & Stofer, R. (2008). Catching up with big fish in the big pond? Multi-level network analysis through linked design. *Social Networks*, 30(2), 159–176.

- Leahey, E. (2006). Transmitting tricks of the trade: Advisors and the development of research knowledge. *Teaching Sociology*, 34(2), 93–110.
- Leahey, E., & Reikowsky, R. C. (2008). Research specialization and collaboration patterns in sociology. *Social Studies of Science*, 38(3), 425–440.
- Lee, C., Schengell, T., & Barber, M. J. (2011). Investigating an online social network using spatial interaction models. *Social Networks*, 33(2), 129–133.
- Lee, K., Brownstein, J. S., Mills, R. G., & Kohane, I. S. (2010). Does collocation inform the impact of collaboration? *PloS One*, 5(12), e14279.
- Lee, Y. S. (2000). The sustainability of university-industry research collaboration: An empirical assessment. *The Journal of Technology Transfer*, 25, 111–133.
- Levin, S., van Laar, C., & Sidanius, J. (2003). The effects of ingroup and outgroup friendships on ethnic attitudes in college: A longitudinal study. *Group Processes & Intergroup Relations*, 6, 76–92.
- Lewis, K., Kaufman, J., & Christakis, N. (2008). The taste for privacy: An analysis of college student privacy settings in an online social network. *Journal of Computer-Mediated Communication*, 14(1), 79–100.
- Lewis, K., Kaufman, J., Gonzalez, M., Wimmer, A., & Christakis, N. (2008). Tastes, ties, and time: A new social network dataset using Facebook.com. *Social Networks*, 30(4), 330–342.
- Leydesdorff, L., & Wagner, C. S. (2008). International collaboration in science and the formation of a core group. *Journal of Informetrics*, 2(4), 317–325.
- Lindelof, P., & Lofsten, H. (2004). Proximity as a resource base for competitive advantage: University-industry links for technology transfer. *The Journal of Technology Transfer*, 29, 311–326.
- Liu, X., Bollen, J., Nelson, M. L., & Van de Sompel, H. (2005). Co-authorship networks in the digital library research community. *Information Processing and Management*, 41(6), 1462–1480.
- Löfsten, H., & Lindelöf, P. (2002). Science parks and the growth of new technology-based firms — Academic-industry links, innovation and markets. *Research Policy*, 31, 859–876.
- Logan, E. L., & Shaw, W. M. J. (1991). A bibliometric analysis of collaboration in a medical specialty. *Scientometrics*, 20(3), 417–426.
- Looy, B. V., Debackere, K., & Andries, P. (2003). Policies to stimulate regional innovation capabilities via university-industry collaboration: an analysis and an assessment. *R and D Management*, 33(2), 209–229.
- Lorigo, L., & Pellacini, F. (2007). Frequency and structure of long distance scholarly collaborations in a physics community. *Journal of the American Society for Information Science and Technology*, 58(10), 1497–1502.
- Luukkonen, T., Persson, O., & Sivertsen, G. (1992). Understanding patterns of international scientific collaboration. *Science, Technology & Human Values*, 17(1), 101–126.
- Luukkonen, T., Tijssen, R. J. W., Persson, O., & Sivertsen, G. (1993). The measurement of international scientific collaboration. *Scientometrics*, 28(1), 15–36.
- Lyle, D. S. (2007). Estimating and interpreting peer and role model effects from randomly assigned social groups at West Point. *The Review of Economics and Statistics*, 89(2), 289–299.
- Madlberger, M., & Roztocki, N. (2009, January 5–8). Digital cross-organizational and cross-border collaboration: A scientometric study. In *Proceedings of the 42nd Hawaii international conference on system sciences* (pp. 1–10), Waikoloa, Big Island, HI, USA.
- Mählck, P., & Persson, O. (2000). Socio-bibliometric mapping of intra-departmental networks. *Scientometrics*, 49(1), 81–91.
- Marques, J. P. C., Caraça, J. M. G., & Diz, H. (2006). How can university-industry-government interactions change the innovation scenario in Portugal?—The case of the University of Coimbra. *Technovation*, 26(4), 534–542.
- Martinez Aleman, A. M., & Wartman, K. L. (2009). *Online social networking on campus: Understanding what matters in student culture*. New York: Routledge.
- Mayer, A., & Puller, S. L. (2008). The old boy (and girl) network: Social network formation on university campuses. *Journal of Public Economics*, 92, 329–347.
- McClintock, C. G., & Turner, H. A. (1962). The impact of college upon political knowledge, participation and values. *Human Relations*, 15, 163–176.

- McDowell, J. M., & Smith, J. K. (1992). The effect of gender-sorting on propensity to coauthor: Implications for academic promotion. *Economic Inquiry*, 30, 68–82.
- McEwan, P. J., & Soderberg, K. A. (2006). Roommate effects on grades: Evidence from first-year housing assignments. *Research in Higher Education*, 47(3), 347–370.
- McFadyen, M. A., & Cannella, A. A. (2004). Social capital and knowledge creation: Diminishing returns of the number and strength of exchange relationships. *Academy of Management Journal*, 47(5), 735–746.
- McFadyen, M. A., Semadeni, M., & Cannella, A. A. (2009). Value of strong ties to disconnected others: Examining knowledge creation in biomedicine. *Organization Science*, 20(3), 552–564.
- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 27, 415–444.
- Melin, G. (2000). Pragmatism and self-organization: Research collaboration on the individual level. *Research Policy*, 29, 31–40.
- Melin, G., & Persson, O. (1996). Studying research collaboration using co-authorships. *Scientometrics*, 36(3), 363–377.
- Menezes, G. V., Ziviani, N., Laender, A. H. F., & Almeida, V. (2009, April 20–24). A geographical analysis of knowledge production in computer science. In *Proceedings of the 18th international conference on world wide web – WWW'09* (pp. 1041–1050). New York: ACM Press.
- Metcalfe, A. S. (2006). The corporate partners of higher education associations: A social network analysis. *Industry & Innovation*, 13(4), 459–479.
- Milojevic, S. (2010). Modes of collaboration in modern science: Beyond power laws and preferential attachment. *Journal of the American Society for Information Science and Technology*, 61(7), 1410–1423.
- Miquel, J. F., & Okubo, Y. (1994). Structure of international collaboration in science – Part II: Comparisons of profiles in countries using a link indicator. *Scientometrics*, 29(2), 271–297.
- Moody, J. (2004). The structure of a social science collaboration network: Disciplinary cohesion from 1963 to 1999. *American Sociological Review*, 69(2), 213–238.
- Morel, C. M., Serruya, S. J., Penna, G. O., & Guimarães, R. (2009). Co-authorship network analysis: a powerful tool for strategic planning of research, development and capacity building programs on neglected diseases. *PLoS Neglected Tropical Diseases*, 3(8), e501.
- Motohashi, K. (2005). University–industry collaborations in Japan: The role of new technology-based firms in transforming the national innovation system. *Research Policy*, 34(5), 583–594.
- Mullins, N. C. (1968). The distribution of social and cultural properties in informal communication networks among biological scientists. *American Sociological Review*, 33(5), 786–797.
- Mullins, N. C., Hargens, L. L., Hecht, P. K., & Kick, E. L. (1977). The group structure of cocitation clusters: A comparative study. *American Sociological Review*, 42(4), 552–562.
- Murray, F. (2002). Innovation as co-evolution of scientific and technological networks: Exploring tissue engineering. *Research Policy*, 31(8–9), 1389–1403.
- Murray, F. (2004). The role of academic inventors in entrepreneurial firms: sharing the laboratory life. *Research Policy*, 33(4), 643–659.
- Nerur, S. P., Rasheed, A. A., & Natarajan, V. (2008). The intellectual structure of the strategic management field: An author co-citation analysis. *Strategic Management Journal*, 29, 319–336.
- Newcomb, T. M. (1961). *The acquaintance process*. New York: Holt, Reinhart, and Winston.
- Newman, M. E. J. (2001a). Scientific collaboration networks. II. Shortest paths, weighted networks, and centrality. *Physical Review E*, 64(1), 1–7.
- Newman, M. E. J. (2001b). Scientific collaboration networks. I. Network construction and fundamental results. *Physical Review E*, 64(1), 1–8.
- Newman, M. E. J. (2001c). The structure of scientific collaboration networks. *Proceedings of the National Academy of Sciences of the United States of America*, 98(2), 404–9.
- Newman, M. E. J. (2001d). Clustering and preferential attachment in growing networks. *Physical Review E*, 64(2), 1–4.

- Newman, M. E. J. (2003). Ego-centered networks and the ripple effect. *Social Networks*, 25(1), 83–95.
- Newman, M. E. J. (2004). Coauthorship networks and patterns of scientific collaboration. *Proceedings of the National Academy of Sciences of the United States of America*, 101(Suppl), 5200–5.
- Newman, M. E. J., & Girvan, M. (2004). Finding and evaluating community structure in networks. *Physical Review E* 69, 026113.
- Oettl, A. (2009). *Productivity, helpfulness and the performance of peers: Exploring the implications of a new taxonomy for star scientists* (University of Toronto Working Paper). Retrieved from http://www.hbs.edu/units/tom/seminars/2007/docs/Productivity_Helpfulness_and_the_Performance_of_Peers_Exploring_the_Implications_of_a_New_Taxonomy_for_Star_Scientists_Oettl.pdf
- Oliver, A. L. (2008). University-based biotechnology spin-offs. In H. Patzelt & T. Brenner (Eds.), *Handbook of bioentrepreneurship* (pp. 193–210). New York: Springer.
- Oliver, A. L., & Ebers, M. (1998). Networking network studies: An analysis of conceptual configurations in the study of inter-organizational relationships. *Organization Studies*, 19(4), 549–583.
- Otte, E., & Rousseau, R. (2002). Social network analysis: A powerful strategy, also for the information sciences. *Journal of Information Science*, 28(6), 441–453.
- Owen-Smith, J., & Powell, W. W. (2003). The expanding role of university patenting in the life sciences: Assessing the importance of experience and connectivity. *Research Policy*, 32, 1695–1711.
- Park, H. W., & Leydesdorff, L. (2010). Longitudinal trends in networks of university–industry–government relations in South Korea: The role of programmatic incentives. *Research Policy*, 39(5), 640–649.
- Pepe, A., & Rodriguez, M. A. (2010). Collaboration in sensor network research: an in-depth longitudinal analysis of assortative mixing patterns. *Scientometrics*, 84(3), 687–701.
- Perc, M. (2010). Growth and structure of Slovenia's scientific collaboration network. *Journal of Informetrics*, 4(4), 475–482.
- Perianes-Rodriguez, A., Olmeda-Gomez, C., & Moya-Anegon, F. (2010). Detecting, identifying and visualizing research groups in coauthorship networks. *Scientometrics*, 82(2), 307–319.
- Peters, H. P. F., & VanRaaij, A. F. J. (1991). Structuring scientific activities by co-author analysis. *Scientometrics*, 20(1), 235–255.
- Pilbeam, C., & Denyer, D. (2009). Lone scholar or community member? The role of student networks in doctoral education in a UK management school. *Studies in Higher Education*, 34(3), 301–318.
- Pilkington, A., & Meredith, J. (2008). The evolution of the intellectual structure of operations management—1980–2006: A citation/co-citation analysis. *Journal of Operations Management*, 27, 185–202.
- Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Administrative Sciences Quarterly*, 41(1), 116–145.
- Powell, W. W., White, D. R., Koput, K. W., & Owen-Smith, J. (2005). Network dynamics and field evolution: The growth of interorganizational collaboration in the life sciences. *The American Journal of Sociology*, 110(4), 1132–1205.
- Price, D. J., & Beaver, D. D. (1966). Collaboration in an invisible college. *The American Psychologist*, 21(11), 1011–8.
- Provan, K. G., Fish, A., & Sydow, J. (2007). Interorganizational networks at the network level: A review of the empirical literature on whole networks. *Journal of Management*, 33(3), 479–516.
- Ramasco, J., Dorogovtsev, S., & Pastor-Satorras, R. (2004). Self-organization of collaboration networks. *Physical Review E*, 70(036106), 1–10.
- Ramlogan, R., Mina, A., Tampubolon, G., & Metcalfe, J. S. (2007). Networks of knowledge: The distributed nature of medical innovation. *Scientometrics*, 70(2), 459–489.
- Rawlings, C. M., & McFarland, D. A. (2011). Influence flows in the academy: Using affiliation networks to assess peer effects among researchers. *Social Science Research*, 40(3), 1001–1017.

- Reader, D., & Watkins, D. (2006). The social and collaborative nature of entrepreneurship scholarship: A co-citation and perceptual analysis. *Entrepreneurship Theory & Practice*, 30, 417–441.
- Rigby, J., & Edler, J. (2005). Peering inside research networks: Some observations on the effect of the intensity of collaboration on the variability of research quality. *Research Policy*, 34(6), 784–794.
- Rizzuto, T. E., LeDoux, J., & Hatala, J. P. (2009). It's not just what you know, it's who you know: Testing a model of the relative importance of social networks to academic performance. *Social Psychology of Education*, 12, 175–189.
- Robins, G., Pattison, P., Kalish, Y., & Lusher, D. (2006). An introduction to exponential random graph (p*) models for social networks. *Social Networks*, 29(2), 173–191.
- Rodriguez, M. A., & Pepe, A. (2008). On the relationship between the structural and socioacademic communities of a coauthorship network. *Journal of Informetrics*, 2(3), 195–201.
- Roth, C., & Cointet, J.-P. (2010). Social and semantic coevolution in knowledge networks epistemic networks. *Social Networks*, 32(1), 16–29.
- Rovai, A. P. (2002). Sense of community, perceived cognitive learning, and persistence in asynchronous learning networks. *The Internet and Higher Education*, 5, 319–332.
- Sacerdote, B. (2001). Peer effects with random assignment: Results for Dartmouth roommates. *Quarterly Journal of Economics*, 116(2), 681–704.
- Sacerdote, B. (2011). Peer effects in education: How might they work, how big are they and how much do we know thus far? In E. Hanushek, S. Machin, & L. Woessmann (Eds.), *Handbook of the economics of education* (1st ed., Vol. 3, pp. 249–277). Amsterdam: Elsevier.
- Saka, A., & Igami, M. (2007). Mapping modern science using co-citation analysis. In *IV'07: Proceedings of the 11th international conference information visualization* (pp. 453–458). Washington, DC: IEEE Computer Society.
- Salganik, M. J., Dodds, P. S., & Watts, D. J. (2006). Experimental study of inequality and unpredictability in an artificial cultural market. *Science*, 311, 854–856.
- Salzinger, L. L. (1982). The ties that bind: The effect of clustering on dyadic relationships. *Social Networks*, 4, 117–145.
- Schofield, J. W., Hausmann, L. R. M., Ye, F., & Woods, R. L. (2010). Intergroup friendships on campus: Predicting close and casual friendships between white and African American first-year college students. *Group Processes & Intergroup Relations*, 13(5), 585–602.
- Scott, J. (2000). *Social network analysis: A handbook*. London: Sage Publications.
- Shi, X., Adamic, L. A., Tseng, B. L., & Clarkson, G. S. (2009). The impact of boundary spanning scholarly publications and patents. *PloS One*, 4(8), e6547.
- Shook, N. J., & Fazio, R. H. (2008a). Roommate relationships: A comparison of interracial and same-race living situations. *Group Processes & Intergroup Relations*, 11(4), 425–437.
- Shook, N. J., & Fazio, R. H. (2008b). Interracial roommate relationships: an experimental field test of the contact hypothesis. *Psychological Science*, 19(7), 717–723.
- Shwed, U., & Bearman, P. S. (2010). The temporal structure of scientific consensus formation. *American Sociological Review*, 75(6), 817–840.
- Shook, N. J., & Fazio, R. H. (2011). Social network integration: A comparison of same-race and interracial roommate relationships. *Group Processes & Intergroup Relations*, 14(3), 399–406.
- Siegfried, J. J., & Gleason, M. A. (2006). *Academic roommate peer effects* (Vanderbilt University & University of Notre Dame Working Paper). Retrieved from <http://colloque-iredu.u-bourgogne.fr/posterscom/communications/Pa19JohnSiegfried.pdf>
- Sigelman, L. (2009). Are two (or three or four ... or nine) heads better than one? Collaboration, multidisciplinary, and publishability. *PS: Political Science & Politics*, 42(03), 507.
- Skahill, M. P. (2003). The role of social support network in college persistence among freshman students. *Journal of College Student Retention*, 4(1), 39–52.
- Small, H. G. (1977). A co-citation model of a scientific specialty: A longitudinal study of collagen research. *Social Studies of Science*, 7(2), 139–166.
- Small, H., & Griffith, B. C. (1974). The structure of scientific literatures I: Identifying and graphing specialties. *Social Studies of Science*, 4(1), 17–40.

- Smeaton, A. F., Keogh, G., Gurrin, C., McDonald, K., & Sødring, T. (2002). Analysis of papers from twenty-five years of SIGIR conferences: What have we been doing for the last quarter of a century? *SIGIR Forum*, 36(2), 39–43.
- Smith, R. A., & Peterson, B. L. (2007). “Psst ... What do you think?” The relationship between advice prestige, type of advice, and academic performance. *Communication Education*, 56(3), 278–291.
- Snijders, T. A. B. (2005). Models for longitudinal network data. In P. Carrington, J. Scott, & S. Wasserman (Eds.), *Models and methods in social network analysis* (pp. 215–247). Cambridge, UK: Cambridge University Press.
- Sorenson, O., & Fleming, L. (2004). Science and the diffusion of knowledge. *Research Policy*, 33, 1615–1634.
- Stinebrickner, R., & Stinebrickner, T. R. (2006). What can be learned about peer effects using college roommates? Evidence from new survey data and students from disadvantaged backgrounds. *Journal of Public Economics*, 90, 1435–1454.
- Taramasco, C., Cointet, J.-P., & Roth, C. (2010). Academic team formation as evolving hypergraphs. *Scientometrics*, 85(3), 721–740.
- Thomas, S. L. (2000). Ties that bind: A social network approach to understanding student integration and persistence. *Journal of Higher Education*, 71(5), 591–615.
- Thune, T. (2007). University–industry collaboration: the network embeddedness approach. *Science and Public Policy*, 34(3), 158–168.
- Tight, M. (2007). Higher education research as tribe, territory and/or community: A co-citation analysis. *Higher Education*, 55(5), 593–605.
- Tomassini, M., & Luthi, L. (2007). Empirical analysis of the evolution of a scientific collaboration network. *Physica A*, 385, 750–764.
- Tomassini, M., Luthi, L., Giacobini, M., & Langdon, W. B. (2006). The structure of the genetic programming collaboration network. *Genetic Programming and Evolvable Machines*, 8(1), 97–103.
- Towles-Schwen, T., & Fazio, R. H. (2006). Automatically activated racial attitudes as predictors of the success of interracial roommate relationships. *Journal of Experimental Social Psychology*, 42(5), 698–705.
- Trail, T. E., Shelton, J. N., & West, T. V. (2009). Interracial roommate relationships: Negotiating daily interactions. *Personality & Social Psychology Bulletin*, 35(6), 671–84.
- Traud, A. L., Kelsic, E. D., Mucha, P. J., & Porter, M. A. (2011). Comparing community structure to characteristics in online collegiate social networks. *SIAM Review*, 53(3), 526–543.
- Udiken, B., & Pasadeos, Y. (1995). Organizational analysis in North America and Europe: A comparison of co-citation networks. *Organization Studies*, 16(3), 503–526.
- Uzzi, B., Amaral, L. A. N., & Reed-Tsochas, F. (2007). Small-world networks and management science research: A review. *European Management Review*, 4, 77–91.
- Valenzuela, S., Park, N., & Kee, K. F. (2009). Is there social capital in a social network site?: Facebook use and college students’ life satisfaction, trust, and participation. *Journal of Computer-Mediated Communication*, 14(4), 875–901.
- van der Leij, M., & Goyal, S. (2011). Strong ties in a small world. *Review of Network Economics*, 10(2), 1–20.
- van Duijn, M. A. J., Zeggelink, E. P. H., Huisman, M., Stokman, F. N., & Wasseur, F. W. (2003). Evolution of sociology freshmen into a friendship network. *Journal of Mathematical Sociology*, 27, 153–191.
- Van Laar, C., Levin, S., Sinclair, S., & Sidanius, J. (2005). The effect of university roommate contact on ethnic attitudes and behavior. *Journal of Experimental Social Psychology*, 41(4), 329–345.
- Verbeek, A., Debackere, K., Luwel, M., & Zimmermann, E. (2002). Measuring progress and evolution in science and technology – I: The multiple uses of bibliometric indicators. *International Journal of Management Reviews*, 4(2), 179–211.
- Wagner, C. S., & Leydesdorff, L. (2005). Network structure, self-organization, and the growth of international collaboration in science. *Research Policy*, 34(10), 1608–1618.
- Waldinger, F. (2009). *Peer effects in science – Evidence from the dismissal of scientists in Nazi Germany* (Center for Economic Performance Discussion Paper No. 910). Retrieved from <http://eprints.lse.ac.uk/28518/>

- Wallace, M. L., Larivière, V., & Gingras, Y. (2012). A small world of citations? The influence of collaboration networks on citation practices. *PloS One*, 7(3), e33339.
- Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge, UK: Cambridge University Press.
- Wejnert, C. (2010). Social network analysis with respondent-driven sampling data: A study of racial integration on campus. *Social Networks*, 32(2), 112–124.
- West, T. V., Pearson, A. R., Dovidio, J. F., Shelton, J. N., & Trail, T. E. (2009). Superordinate identity and intergroup roommate friendship development. *Journal of Experimental Social Psychology*, 45(6), 1266–1272.
- White, H. D., & McCain, K. W. (1998). Visualizing a discipline: An author co-citation analysis of information science, 1972–1995. *Journal of the American Society for Information Science*, 49(4), 327–355.
- Wimmer, A., & Lewis, K. (2010). Beyond and below racial homophily: ERG models of a friendship network documented on Facebook. *The American Journal of Sociology*, 116(2), 583–642.
- Winston, G., & Zimmerman, D. (2004). Peer effects in higher education. In C. M. Hoxby (Ed.), *College choices: The economics of where to go, when to go, and how to pay for it* (Vol. I, pp. 395–423). Chicago: University of Chicago Press.
- Wuchty, S., Jones, B. F., & Uzzi, B. (2007). The increasing dominance of teams in production of knowledge. *Science*, 316, 1036–9.
- Xu, J., & Chau, M. (2006). The social identity of IS: Analyzing the collaboration network of the ICIS conferences (1980–2005). *Twenty-seventh international conference on information systems* (pp. 569–590), Milwaukee, WI.
- Yan, E., & Ding, Y. (2009). Applying centrality measures to impact analysis: A coauthorship network analysis. *Journal of the American Society for Information Science*, 60(10), 2107–2118.
- Yang, C. H., Park, H. W., & Heo, J. (2010). A network analysis of interdisciplinary research relationships: The Korean government's R&D grant program. *Scientometrics*, 83(1), 77–92.
- Yang, Z., Jaramillo, F., & Chonko, L. B. (2009). Productivity and coauthorship in JPSSM: A social network analysis. *Journal of Personal Selling and Sales Management*, 30(1), 47–71.
- Yeung, Y.-Y., Liu, T. C.-Y., & Ng, P.-H. (2005). A social network analysis of research collaboration in physics education. *American Journal of Physics*, 73(2), 145.
- Zimmerman, D. J. (2003). Peer effects in academic outcomes: Evidence from a natural experiment. *The Review of Economics and Statistics*, 85(1), 9–23.

Chapter 5

Research Integrity and Misconduct in the Academic Profession

Melissa S. Anderson, Marta A. Shaw, Nicholas H. Steneck, Erin Konkle,
and Takehito Kamata

Introduction

Research integrity is the foundation of the public's trust in the academic research system. It is the basis for continued investment in research and reliance on scientific¹ findings in decision-making. Integrity is also a bedrock value of the scientific community, strongly affirmed by researchers at all levels. It is of critical importance to professionals throughout the affiliated research infrastructure, including funders, oversight agencies, journals, and administration.

Compromises to the integrity of research through misconduct or other improprieties threaten financial, political, and social support for research, as well as the autonomy of the academic profession. Past challenges to integrity have sometimes prompted salutary clarification and reinforcement of standards, policies, and responsible practices of research. It would be better for the overall research enterprise, however, to ensure integrity proactively, before a crisis arises.

In this chapter, we review the recent history of research integrity and misconduct in the United States. We then examine scientific misconduct in terms of its prevalence and its manifestation in specific, notorious cases. Next, we turn to factors associated with misconduct, as well as the consequences of misconduct. We review

M.S. Anderson, Ph.D. (✉) • M.A. Shaw • E. Konkle • T. Kamata
Department of Organizational Leadership, Policy, and Development, University of Minnesota,
330 Wulling Hall, 86 Pleasant Street, SE, Minneapolis, MN 55455, USA
e-mail: mand@umn.edu; martashaw@umn.edu; konkl011@umn.edu; kama0086@umn.edu

N.H. Steneck, Ph.D.
MICHR Research Ethics and Integrity Program, University of Michigan,
127 Grandview Drive, Ann Arbor, MI 48103, USA
e-mail: nsteneck@umich.edu

an array of efforts to promote integrity and deter misconduct, and conclude with suggestions for further research. Our review focuses primarily on empirical studies and policy documents from 2000 to the present.

The Scope of Research Integrity and Research Misconduct

In general terms, integrity and misconduct refer, respectively, to right and wrong behavior in research. In the United States over the past 30 years, the emergence of policies and oversight mechanisms has led to greater specificity in these concepts. Regulatory responsibility has required more careful delineation between what does and does not fall under these rubrics, especially misconduct.

Research Integrity

Research integrity applies first and foremost to research findings. The term *integrity* has proven difficult to define in this context, as its usual synonyms (e.g., honesty, truthfulness, accuracy, rightness, incorruptibility, honor, propriety) fail to capture its full connotation. Standard definitions often include the idea of wholeness, reflecting the word's origin in the Latin *integer*, meaning whole or complete. The problem is compounded by the difficulty of translating *integrity* into other languages, many of which have no comparable term.

The term's value to the research community is more dependent on practical usage than on conceptual specificity. In practice, integrity is a matter of trustworthiness, and so the *Singapore Statement* (Singapore Statement on Research Integrity, 2010), written to provide guidance on research integrity worldwide, identifies integrity with the trustworthiness of research. Research findings have integrity if they can be trusted by researchers who will learn from and build on those findings; by practitioners who will base decisions on them; and by funders, institutions, and publishers whose credibility is linked with the results they support and promote.

The integrity of research findings is, in turn, dependent on the integrity of the research process that produced them, including data, methods of analysis, and presentation and interpretation in publications. Here, integrity is a matter of careful and precise work that meets the standards of the scientific method and best practice in the relevant field(s), as well as transparency in the presentation of all results and appropriately justified interpretations of all findings. In practice, integrity of the research process is indicated when the research stands up to scrutiny by well-informed peers (or would, even if such scrutiny is never applied).

Integrity can be thought of as a property of research itself, but responsibility is in fact vested in people and institutions. It is therefore appropriate to note that researchers themselves – as individuals, in teams, or as the scientific community

writ large – also exhibit integrity in varying degrees. Insofar as research policy, procedures, and practices are institutionalized, they indicate research organizations' integrity. Of course, neither people nor institutions are perfect (as integrity's connotation of *lack of defect* would suggest), and so their integrity is appropriately judged against standards of conduct and practice, not against ideals. These standards are codified in policies, rules, regulations, codes of conduct, best practices, and so on, which are adopted at levels ranging from the federal government to the individual investigator's own laboratory or research team.

There are also variations in standards of research integrity. Over time, as methods are refined and new approaches for ensuring reliability and transparency emerge, integrity standards may become more stringent. Across disciplines, standards for assessing the adequacy of data and methods differ, as, for example, measurements in physics are typically far more precise than measurements in sociology. Across national contexts, integrity standards linked to substantially different policies and regulations may vary (Anderson & Steneck, 2011). In terms of the researcher's development, standards may tighten as one moves from undergraduate research in a course to publication of research findings as a mature scientist.

We note that research integrity, as it is applied in the literature and in this chapter, is limited to the production of research itself. It does not apply to ethical issues associated with human subjects or bioethics. It likewise does not reflect the personal morality of researchers or the legality or ethics of institutions' actions apart from their involvement in research. This distinction is not observed worldwide, however, and it may seem inappropriate to researchers and officers in some other parts of the world. It is largely an artifact of the distinction between research integrity and human research ethics accomplished by the separate development of the US Office of Research Integrity and the Office of Human Research Protection within the federal government.

Research Misconduct

In the USA, there is no federal definition of research integrity, but there is a definition of misconduct in the *Federal Policy on Research Misconduct*, issued by the White House Office of Science and Technology Policy (2000):

Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.

Fabrication is making up data or results and recording or reporting them.

Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.

Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.

Research misconduct does not include honest error or differences of opinion. (Executive Office of the President, 2000)

This definition, whose historical development we review below, is confined to three specific behaviors. As such, it does not fully represent the scope of challenges to the integrity of research. Other misbehaviors, such as undisclosed conflict of interest or violations of research policies, may pose threats to the trustworthiness of research processes and findings. In fact, it is possible that they have greater impact on the research enterprise, by virtue of their greater prevalence. These behaviors have been called *questionable research practices* or *misbehaviors* (Panel on Scientific Responsibility and the Conduct of Research, 1992).

Most research institutions in the USA have codes of conduct or policies that specify research misconduct for their own employees. Many such policies adopt the federal definition, but some extend the definition to other behaviors. Worldwide, there is no single definition of misconduct, and policies vary considerably.

History of Research Integrity and Misconduct in the United States

The scientific community has a great deal at stake when it comes to public trust in research integrity. Compromised credibility can be career-ending for a single researcher; diminished credibility throughout an entire field threatens every researcher's ability to practice effectively and contribute to the public good. It can also negatively affect the knowledge base of an academic discipline, when false data and misattributed authorship distort the scientific record. In the United States over the past 30 years, research integrity and misconduct have been caught up in an expanding infrastructure of regulation and oversight, particularly at the federal level. Before this process began and to some extent throughout the process, researchers argued that self-regulation should serve as the necessary and sufficient guarantor of scientific integrity.

Self-Regulation

Since the emergence of formal scientific research at the end of the nineteenth century, the scientific community has affirmed self-regulation as its right and responsibility in the assurance of research integrity. Self-regulation is vested in individual researchers who are responsible for the integrity of their own work and output, in research institutions and associated organizations such as funding agencies which have organizational responsibility for their employees and members, and in the community of scientists who bear collective responsibility for the progress of science in accordance with the highest standards of integrity. Self-regulation has been key to the social contract whereby society has granted

autonomy to the academic profession in exchange for the profession's responsible oversight of its members and their work (Fox & Braxton, 1999). The rationale for self-regulation is that research requires specific expertise that is not widely available, and only those who understand the work itself are qualified to pass judgment on its integrity. This reasoning has not been lost in subsequent policy development, as many aspects of science in the USA and worldwide are still supported by self-regulation. It has not, however, been adequate as a defense against the expansion of formal mechanisms of oversight.

Self-regulation of research has eight components that together support research integrity. First, researchers are assumed to be generally good people who are motivated by intellectual curiosity. As a group, they are highly intelligent and committed to work that pays less than they might receive in other occupations. All researchers have some instructional role, even if only through their publications. They therefore occupy the pinnacle of an educational structure whose eleemosynary purposes are assumed to attract good, trustworthy, not wicked, people.

Second, the broadest purpose of research is the pursuit of truth. All forms of misconduct and other questionable research practices compromise the truth of research results and are therefore incompatible with its fundamental purpose. Third, the scientific method and other standardized approaches dictate good practice that supports the search for truth.

Fourth, the scientific community espouses and enacts norms that provide guidance to the members (Anderson et al., 2010; Merton, 1942; Resnik, 2007). These norms are shared understandings about appropriate and expected behavior within the community. Merton's early statement of norms, derived from observations of scientists at work, identified four: universalism, disinterestedness, communality, and organized skepticism. Each of these norms supports research integrity by emphasizing fair and open assessment of research findings and countering the influence of distorting bias. Fifth, the long training process that researchers go through, the socialization to the field that accompanies training, and the examinations such as doctoral defenses that complete the process are means of ensuring that those who enter research careers have the knowledge and habits necessary for conducting their work with competence and integrity (Austin, 2002).

Sixth, peer review is something like a continuous extension of those final examinations. On the basis of their expertise, peers review a scientist's work and record at decision points related to hiring, promotion, tenure, salary, ascent to leadership positions, and submission of grants and manuscripts for publication (Chubin & Hackett, 1990). The community of peers takes on the responsibility, largely uncompensated, of ensuring that researchers and their work are deserving of the rewards of academic research. Peer review is subject to pressures as competition for funding and positions increases (Goodstein, 2002). Seventh, replication serves as a check on scientists' findings; work that cannot be replicated may fall under suspicion. This form of self-regulation by the community is unfortunately weak, in that few scientists can afford the time or resources to replicate others' work instead of pursuing their own, and there are few incentives or rewards for doing so.

Finally, whistle-blowing or raising a public accusation of wrongdoing, as a means of enforcing the community's standards, is an aspect of self-regulation (Rennie & Crosby, 2002). When done in good faith and for the good of the research community, it is often an act of courage to stand up for integrity, sometimes at great personal cost.

With so elaborate a system of self-regulation in place, researchers have argued that further regulatory oversight is unneeded. Indeed, Daniel Koshland, then the editor of *Science*, famously asserted in 1987 that “99.9999% of [scientific] reports are accurate and truthful” (Koshland, 1987). Within a few years, federal attention to notorious cases of misconduct had made this claim irrelevant.

The Emergence of Regulatory Oversight

When a researcher suspects a colleague, student, or staff member of engaging in research misconduct, and the research in question has been funded by the US Federal Government, federal rules require that the suspicions be reported to an institutional official. Prior to 1986, there were no government rules for reporting misconduct in research, and little was known about it. Common opinion among research professionals held serious misconduct in research to be *rare* and best controlled through professional self-regulation. (For summaries of the early history, see LaFollette, 1994; Steneck, 1994, 1999).

The transition from an unregulated and largely unrecognized to a globally recognized problem began in 1981 with hearings before the US House of Representatives. At the time, research misconduct was not new; it is as old as scholarly research and was even the subject of an 1830 book by the nineteenth-century scientist, Charles Babbage (Altman, 1994). It became newsworthy, however, when a particular case ensnared several leading research institutions, including Harvard and Emory; a world-class cardiologist, Eugene Braunwald; and an ambitious young researcher, John Darsee, who was responsible for the misconduct. This and other cases were soon seen as newsworthy by the press, notably the journalist team of William Broad and Nicholas Wade (Broad & Wade, 1982), and subsequently drew the attention of Congress, which is often interested in stories that will attract public attention as well as serve the interests of the public.

Had researchers taken misconduct as a serious problem that needed to be addressed in 1981, Congressional interest might have waned quickly. However, for the most part they did not, and when new, equally prominent cases arose a few years later, Congress acted. In 1985, it incorporated into the Health Research Extension Act, a short section on “Protection against scientific fraud” (United States Congress, 1985). In it, Congress directed the Secretary of Health and Human Services (HHS) to require institutions receiving research funding from HHS to establish procedures for investigating and reporting *fraud*, the term originally used for what we now call *research misconduct*.

Over the ensuing decades, hundreds of millions of dollars have been spent establishing offices and official policies, coming to agreement on a common definition of research misconduct, developing training programs, and fostering research on research integrity. The following description briefly covers some of the highlights of these developments (Steneck, 1994, 1999).

Offices and Procedures

Since the early cases of misconduct were primarily in biomedical research, the responsibility for responding was initially delegated to the Secretary of HHS, who turned to the National Institutes of Health (NIH) for policy leadership. In 1986, NIH issued interim policies for research misconduct (National Institutes of Health, 1986). Three years later, it helped establish two misconduct offices: the Office of Scientific Integrity in NIH and the Office of Scientific Integrity Review in the HHS. These offices were subsequently combined into one office, establishing the Office of Research Integrity (ORI). Over roughly the same time frame, the National Science Foundation (NSF) also addressed the issue of misconduct in research, assigning responsibility for NSF-funded research to the NSF Inspector General (Steneck, 1999).

The emergence of two separate misconduct offices established the pattern for subsequent misconduct policy development in the USA, which had contemplated a centralized system for research funding after World War II but eventually adopted a decentralized system. Today, more than ten agencies have misconduct policies and offices, each of which is organized and operates in slightly different ways. (For a partial list of Federal research misconduct policies, see ori.hhs.gov/federal-policies). Dozens of offices, departments, agencies, and others fund research and could play roles in responding to research misconduct. Every major university that receives federal funding must have a research misconduct policy (US Department of Health & Human Services, 2005). Overall, the hundreds of policies and offices in place for responding to misconduct must follow basic rules set out in 2000 by the Office of Science and Technology Policy, but there is considerable variation in how these policies and offices operate and insufficient knowledge among researchers of the policies or operation.

Moreover, the USA has no national system for reporting and accountability. Research institutions, which have initial responsibility for responding to and reporting misconduct, need only report to the relevant funding agency when they confirm misconduct. Most of the federal funding agencies do not publish annual reports that include information about research misconduct, which makes it difficult to study or assess the integrity of US research. The two best-organized research misconduct offices, ORI and the NSF Office of the Inspector General, oversee about 25% of all US federally funded research and 53% of all federally funded civilian research (Sargent, 2011). Through their reports and activities, it is possible to get a basic understanding of research integrity in the USA, but unfortunately not a comprehensive one, since little is known about research integrity in research that is funded by

the military or industry. The annual reports of the ORI (US Department of Health and Human Services, U.S. Department of Health & Human Services, 2010) and the NSF Office of the Inspector General (National Science Foundation, Office of Inspector General, 2011) include information on misconduct investigations over the prior year. The offices in other agencies responsible for implementation of the 2000 OSTP policies do not report similar information and there are no reporting requirements for reporting misconduct in nongovernment-funded research. In sum, what began as a centralized effort to assure the integrity of US research evolved over time into a decentralized system that has been pioneering in some ways but lax in others.

Regulation by Other Organizations

Research institutions are ultimately responsible for researchers and the work that they produce (Steneck, 2008). Institutions are also subject to federal policy and guidelines because they accept federal funds. As employers, they have the capacity to require compliance with federal rules and to sanction researchers who misbehave.

Journals and, where relevant, the associations that publish them do not have regulatory roles (Anderson & Shultz, 2003; Johnson, 1999). They are, however, often the point of first notification of suspected fabrication, falsification, and plagiarism, as each of these forms of misconduct is generally discovered in published work. It is their responsibility to do everything possible to ensure that their publications are free of ethically questionable research, that accusations are taken seriously, and that the scientific record is corrected through retractions of research that involves misconduct. Journals' ability to deal with fraudulent submissions is complicated by the deception involved in misconduct and the trust that underlies the peer-review process (Fox, 1999). The Code of Conduct of the International Committee on Publication Ethics (publicationethics.org/resources/code-conduct) is an example of journals' efforts to fulfill their responsibilities with regard to scientific integrity and related issues.

Definitions

The one exception to the decentralized nature of US research misconduct policy is the definition of research misconduct, which was centrally established by the 2000 Office of Science and Technology Policy's *Federal Policy on Research Misconduct* (Executive Office of the President, 2000). The definition set forth in this policy was significantly influenced by a 14-year effort by a few leading researchers and professional organizations to limit the role of government in science.

As noted above, when Congress first addressed this issue, they spoke in terms of *fraud*. Researchers who made up results or otherwise cheated were essentially stealing and defrauding the public of the goods they expected when the research was funded. The government agencies that implemented the fraud provision in the 1985 Health

Research Extension Act quickly changed the focus of attention to *misconduct*. However, the proposed scope of misbehaviors classed as *possible misconduct* was initially fairly broad. In its 1986 interim policy, NIH defined misconduct as

- (1) serious deviation, such as fabrication, falsification, or plagiarism, from accepted practices in carrying out research or in reporting the results of research; or (2) material failure to comply with Federal requirements. (National Institutes of Health, 1986)

This left the door open to the investigation of any practices that represented a “serious deviation ... from accepted practices.” A year later, NSF specifically identified *fabrication, falsification, and plagiarism* (FFP) as the main categories of research misconduct, but left room for consideration of “other serious deviation from accepted practices in proposing, carrying out, or reporting results from research” (National Science Foundation, 1987).

For the next decade, researchers and the government engaged in a prolonged discussion of the proper definition of research misconduct. NSF in particular argued for the necessity of keeping the *other serious deviations* clause. A number of researchers and a few professional societies felt this clause constrained scientific freedom and needed to be dropped. They were supported by an influential 1992 report from the National Academies of Science (Panel on Scientific Responsibility and the Conduct of Research, 1992). However, alternative definitions suggested in the National Academies report and by the Ryan Commission, which was set up specifically to come up with a new definition (Ryan, 1996), failed to develop an alternative definition.

In the end, the Office of Science and Technology Policy, relying on advice from government advisory committees, kept FFP as the central element of the US definition of research misconduct and relegated the *other serious deviations* clause to a section on standards of proof. The final wording thereby narrowed the US definition of research misconduct from the initial, broad “serious deviation from accepted practices” to only “FFP that seriously deviates from accepted practices”, leaving what the 1992 National Academies of Science report called *Questionable Research Practices* largely unregulated. The responsibility for assessing and responding to these other practices, such as failure to report conflicts of interest, undeserved or unrecognized authorship, and deliberately biased design or interpretation, rests largely with research institutions and professional societies.

Training in the Responsible Conduct of Research

While much of the blame for the apparently growing number of misconduct cases in the late 1970s and early 1980s was attributed to a few so-called bad apples, there was some recognition that poor training also might be a contributing factor. In 1980, the American Association for the Advancement of Science surveyed its affiliate societies and discovered that little attention and resources were directed toward the development of responsible conduct and urged more attention be given to training

(Iverson, Frankel, & Siang, 2003). This suggestion was part of a growing call that began what has become over time a robust effort in the USA to provide formal training on the responsible conduct of research (RCR). The responsible conduct of research is “conducting research in ways that fulfill the professional responsibilities of researchers, as defined by their professional organizations, the institutions for which they work and, when relevant, the government and the public” (Steneck, 2006, p. 55). The need for better training was nationally recognized in 1989 with the publication of the Institute of Medicine Report, *Responsible Conduct of Research in the Health Sciences*, and the first NIH Training Grant Requirement (Steneck & Bulger, 2007).

The NIH Training Grant Requirement adopted a different approach to regulation. Rather than setting out specific rules for RCR training, it simply required applicants to describe how they proposed to provide RCR training for their trainees. Since applications were not considered without this information and any weakness in an application might reduce the chances of receiving funding, researchers quickly complied, resulting in a rapid expansion of RCR training. Over the 1990s, the first RCR textbooks appeared (e.g., Macrina, 1995) and faculty began teaching a wide range of courses (Steneck & Bulger, 2007).

Efforts to improve training for researchers received a minor setback in 2000 when Congress, responding to a vigorous lobbying campaign by a small but influential group of researchers, stopped ORI from instituting a broad RCR training requirement for all HHS-funded researchers (Steneck & Bulger, 2007). However, the Training Grant Requirement remained in effect and was augmented in 2000 with a new NIH requirement for ethics training for researchers who conduct human subjects research (National Institutes of Health, 2000). Moreover, a few months earlier, HHS Secretary Donna Shalala had issued an order that significantly enhanced ORI’s educational mission, allowing it to develop a multipronged effort to strengthen RCR training (Federal Register, 2000).

ORI used its expanded authority to fund a number of programs and collaborations. One program provided support for RCR instructors to develop new training materials. In collaboration with the American Association of Medical Colleges, support was offered to professional societies to develop codes of conduct and professional programs to promote integrity (ori.hhs.gov/program-academic-societies). Another collaboration, with the Council for Graduate Schools, led to the development of the CGS Project on Scholarly Integrity and the Responsible Conduct of Research (CGS, 2003). ORI support helped the Collaborative Institutional Training Initiative, better known as *CITI*, (www.citiprogram.org) develop its RCR modules, and in 2004, ORI issued its own *Introduction to the Responsible Conduct of Research* (ORI, 2004).

In a reversal of position, Congress recently weighed in again, this time requiring the National Science Foundation to issue an RCR requirement. NSF had implemented its own RCR Training Grant Requirement in the 1990s, but did not follow the lead of ORI in developing an active program to foster integrity, believing that this is best done by institutions without government interference. The 2009 mandate stipulated: “The [NSF] Director shall require that each institution that applies for

financial assistance from the Foundation for science and engineering research or education describe in its grant proposal a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate students, graduate students, and postdoctoral researchers participating in the proposed research project” (www.nsf.gov/bfa/dias/policy/rcr.jsp).

It also significantly broadened the scope of required RCR training in the USA to include most major research universities and many smaller ones as well. This set the stage for the next major challenge: making sure that the training provided actually does encourage researchers to set high standards for research throughout their careers.

Research on Research Integrity

Most research is empirically driven. The way to solve problems is to gather evidence and use it to reach conclusions or make decisions. Unfortunately, the researchers and policy makers who first confronted the problem of research misconduct did not apply this method to the problem at hand. Instead, they relied on personal experience and opinion, which we now know was inaccurate and not well informed. For example, the common assertion, then and now, that *misconduct in research is rare* has not been empirically verified. Every study undertaken on research misconduct, as evidenced later in this chapter, has reported embarrassingly high rates of occurrence.

As ORI’s efforts to place more emphasis on fostering integrity in research took shape in the late 1990s, Director Chris Pascal and Associate Director Larry Rhoades asked HHS leadership for \$1 million per year in additional funding to start a research on research integrity program. They argued that the research was needed to develop effective policies to promote integrity. Who commits misconduct? Why? What factors influence research behavior, positively and negatively? Answers to these and related questions were essential for responsible policy development. When HHS agreed, the wheels were set in motion to establish such a program, beginning with seeking the advice of a small advisory committee (Scheetz & Steneck, 2001).

Founding this essentially new field of research presented a number of challenges. If little or no such research on research integrity had been done before, who would be in a position to provide advice? To solve this problem, ORI turned to researchers who studied deviant behavior in other professions, including historians and sociologists of science. There was also the challenge of administering the program. ORI did not have granting authority or the expertise to conduct peer review. After considering a number of options, an offer of assistance from Connie Atwell, Associate Director for Research at the NIH National Institute for Neurological Disorders and Stroke, provided the ideal solution. With both administrative assistance and the promise of grant support from NIH, in the fall of 2000, the joint ORI/NIH Research on Research Integrity Program was announced, with first submissions due shortly after the first ORI Research on Research Integrity Conference (Scheetz & Steneck, 2001).

It would be a mistake to trace the impetus for research on research integrity solely to the ORI/NIH program. As this chapter makes clear, researchers and scholars have been interested in deviant behavior in research for a long time. One of the most detailed early studies (Zuckerman, 1977) was published before the 1980 Congressional hearings. But the early work was spotty and not always reliable. Most of the early surveys of the prevalence of misconduct were methodologically flawed. Over half of the articles identified in a survey of the literature presented at the first Research on Research Integrity conference focused on publication practices (Steneck, 2002).

While it did not begin research on research integrity, the ORI/NIH program partially accomplished two important goals. First, it identified research on research integrity as a legitimate and independent field of study. Second, it started the process of professionalizing the new field of study. Although the awards granted remained small in size relative to other NIH awards, there was enough funding for a small group of scholars to meet, collaborate, and get recognition as specialists in research on research integrity.

Current Status and Next Steps

The literature suggests that regulation of research misconduct is still not doing enough to address this serious problem in the scientific community. Steneck (2006) has recommended four action items to the scientific community to promote integrity. First, the scientific community must see research integrity as a norm and expectation rather than an aspiration. Second, those expectations need to be clearly articulated and explicitly taught, rather than expecting researchers to *just know* what is and is not acceptable. Third, institutions must foster environments that promote integrity including continuous assessment, clear reporting systems, and diffusion of hostilities that may exist toward eliminating misconduct. Finally, the federal government should be allowed the necessary latitude to investigate misconduct and to implement policies and procedures to deter it in the future. This includes allowing the federal government to create policies that address not only the currently recognized forms of misconduct (fabrication, falsification, and plagiarism) but also more subjective and loosely defined questionable research practices.

Scientific societies likewise do not have regulatory responsibilities, but they often issue codes of ethics or codes of conduct that apply to their members (Frankel, 1989). An association's code may serve as the *de facto* code for the discipline, if the issuing society is the primary voice for the field, as is the case for the American Psychological Association's *Ethical Principles of Psychologists and Code of Conduct* (www.apa.org/ethics/code/index.aspx). In general, compliance with an association's code is enforced only among the group's membership, if indeed enforcement is part of the code.

Research Misconduct

Despite the considerable infrastructure for oversight and regulation of research, cases of misconduct continue to plague academic science. They occur with regularity, though their actual frequency is indeterminate, and most observers still view them as exceptions to typical research behavior.

We review here some major cases of misconduct as background to a subsequent consideration of the prevalence of misconduct. We then examine factors that are associated with misconduct, which we hesitate to identify as *causes* of misconduct, since no causal analyses have yet been devised. We also review the consequences of misconduct for the researchers and organizations involved.

Cases of Misconduct

William Summerlin conducted research on transplantation immunology and studied the rejection mechanisms of animal and human organ transplants at the Memorial Sloan-Kettering Cancer Center in New York. He believed that “placing donor organs in tissue culture for a period of some days or weeks before transplantation” could prevent the problem of immune rejections (Committee on the Conduct of Science, 1989, p. 15). Other scientists reported that they were having trouble duplicating Summerlin’s experiments. In 1974, in order to support his research hypothesis, Summerlin used a felt-tipped pen to blacken a skin patch on a white mouse (Basu, 2006, p. 493). He intended the white mouse’s skin to look as if it had a black skin graft. An assistant in the laboratory discovered that the white mouse’s darker-colored skin grafts could be wiped away with alcohol. An investigation committee at the Memorial Sloan-Kettering Cancer Center later described Summerlin’s behaviors as related to “serious, emotional disturbance” and gave him 1 year of paid sick leave. Summerlin moved to Louisiana and became a country doctor (Basu, 2006, p. 493).

John Darsee was a junior scientist working in cardiology at Harvard University in Cambridge, Massachusetts. He worked with physicians at the Emory University School of Medicine and Harvard Medical School in heart research experiments using animal models to measure drug-use effectiveness in heart attack treatments. Between 1978 and 1981, he published articles with approximately 50 different scientists in major journals. However, in 1981, some scientists independently expressed suspicions about Darsee’s experiments. According to the investigation committee at the National Institutes of Health (NIH), Darsee falsified electrocardiogram data at Harvard and Emory Universities (Angier, 1990; Hunt, 1989). A laboratory director pointed out that Darsee faked data “to make a few hours’ work look like 2 weeks’ worth of data” (Wallis, Wymelenberg, & Schapiro, 1983). Darsee admitted that he had fabricated data in more than 100 research papers over the previous 14 years. The NIH criticized Darsee’s supervisors for not observing him closely enough in his research activities, and the NIH decided that Darsee would be banned from receiving federal research funds for 10 years. In addition, the NIH

requested that Harvard University repay \$122,371 in misused funds from the study (Wallis, Wymelenberg, & Schapiro, 1983). After a criminal conviction, Darsee obtained a 2-year critical-care medicine fellowship at Ellis Hospital in Schenectady and did not engage in research again (Basu, 2006, p. 493; Wallis, Wymelenberg, & Schapiro, 1983).

Jan Hendrik Schön was a physicist in nanotechnology at Bell Laboratories in Murray Hill, New Jersey. Schön was a leading scholar in nanotechnology. From 1998 to 2001, Schön fabricated data, falsified reports, and utilized identical graphs for different research experiment reports. In 2001, he published on average one research paper every 8 days (Park, 2008). Nanotechnology scientists noticed some issues with the data graphs in his studies and started questioning the validity of Schön's data (Minkel, 2003; Smaglik, 2002). In 2002, Schön admitted to fabricating and falsifying data in studies between 1998 and 2001. The American Physical Society (APS), the American Institute of Physics (AIP), *Nature*, and *Science* all decided to retract papers published by Schön and his collaborators (Service, 2003).

Woo Suk Hwang was a professor of biotechnology and theriogenology at Seoul National University in Seoul, South Korea (Kakuk, 2009). Hwang conducted stem-cell research and, in 2004, claimed to have created the first human cloned embryos in the world and to have removed stem cells from the cloned embryos (Choe, 2009). Scientists expected that, by applying Hwang's results, they could produce cloning tissues in many medical experiments and studies; however, other scientists claimed that they could not replicate Hwang's study results. In 2005, an investigative team led by the Seoul-based Munhwa Broadcasting Corporation, a Korean TV network, conducted an investigation into Hwang's studies. The investigation team members found ethical issues in Hwang's research procedures, specifically, false data about egg donation (Lemonick, 2006). As a result, Hwang was accused of falsifying research evidence about the reported cell lines and violating ethical codes regarding the treatment of research participants (Normile, Vogel, & Holden, 2005). Hwang lost his job at Seoul National University in March 2006. Hwang and his research associates moved to the Soom Bioengineering Research Institute in Yongin in South Korea (Card, 2009).

Eric Poehlman was a physiologist at the University of Vermont in Burlington. Poehlman conducted research in the fields of aging, obesity, metabolism, and menopause. Between 1992 and 2002, Poehlman falsified and fabricated research data to support his academic research proposals in federal grant applications and in more than 10 academic articles (US Department of Justice, 2005). In order to obtain research grants for his proposed research, Poehlman fabricated and falsified research data in the *preliminary studies* part of the grant applications (US Department of Justice). Walter DeNino, who was a postdoctoral researcher at the University of Vermont, reported that Poehlman falsified research data in his studies. In 2001, Poehlman took legal action in federal court against the University of Vermont to stop the ORI from investing his misconduct case (Dalton, 2005). Then, Poehlman moved to the Université de Montréal and continued his research there, funded by the Canadian government until 2003. In 2004, DeNino filed a federal suit against Poehlman regarding data alterations. Poehlman admitted that he had changed

original data on a long-term study on aging and falsified data in applications for federal grants. Sentenced to 12 months and a day, Poehlman became the first scientist who would serve federal prison time for research misconduct charges (Kintisch, 2006). As a result, he was permanently banned from applying for federal funding grants and fined \$180,000.

Jon Sudbø was an oral cancer researcher in the Norwegian Radium Hospital at the University of Oslo in Norway. Sudbø studied the mechanisms by which anti-inflammatory drugs reduce the risks of mouth cancers. Sudbø fabricated statistics in an article published in the *New England Journal of Medicine* and used falsified blood test data in an article in the *Journal of Clinical Oncology* (Hafstad, 2006a). Sudbø also invented data for 908 patients in a study published in *The Lancet* (Marshall, 2006; Seppa, 2006). It was reported that Sudbø had engaged in systematic data falsification practices. Camilla Stoltenberg, the scientist who discovered Sudbø's misconduct behaviors, was a director of epidemiology at the Norwegian Institute of Public Health (NIHE) (Marris, 2006). Sudbø claimed to have used data for which Stoltenberg was responsible. She knew that he could not possibly have based his work on her data. He eventually admitted that the data did not come from her dataset or any other but were fabricated (Marris, 2006). In 2006, an investigation committee concluded that Sudbø had engaged in continuous falsification activities from the late 1990s to 2006 (Hafstad, 2006b). A separate investigation committee confirmed that Sudbø used fabricated data in his scientific publications (Marshall, 2006).

Pattium Chiranjeevi was a chemistry professor at Sri Venkateswara University in Tirupati, India. From 2004 to 2007, Chiranjeevi published falsified and plagiarized research papers in Western scientific journals (Schulz, 2008). Chiranjeevi asked his students to collect research papers from the Internet. According to one of his students, Chiranjeevi questioned his students by asking "Well, what have you downloaded today?" (Jayaraman, 2008). He obtained copies of published papers in chemistry on the Internet and submitted them for publication, replacing the original authors' names with his own (Gallant, 2011). Although some of his coauthors and students noticed his research misconduct, the university did not take actions against Chiranjeevi. Purnendu Dasgupta, who was a professor in chemistry at the University of Texas, pointed out that Chiranjeevi's arsenic measurement technique looked like that used by a Japanese study group (Schulz). In addition, the investigation committee discovered that Chiranjeevi could not have done his experiments because absorption spectrometers and atomic emission devices used in Chiranjeevi's studies did not exist at Sri Venkateswara University (Jayaraman).

Andrew Wakefield claimed that giving the vaccine for measles, mumps, and rubella would affect children's immune systems and harm neurons in their brains (Dominus, 2011). Wakefield conducted studies in gastroenterology research, and in 1998, he publicly announced his concerns about "the safety of the measles-mumps-rubella vaccine (M.M.R.) and its relationship to the onset of autism" (Dominus). His paper, based on false information, discouraged British parents from getting the triple vaccine and led to an increase in child measles. Studies by other scientists showed no correlation between autism and the MMR vaccine. His public statements exerted

a substantial impact on vaccine treatments and discouraged British parents from obtaining the triple vaccine. In fact, Giles (2004) noted that in the UK the “national take-up of the MMR jab dropped from around 90% in 1998 to its current level of less than 80%” (p. 765). The General Medical Council invalidated Wakefield’s medical license after recognizing the ethical violations in his studies. Wakefield’s misconduct has been associated with widespread outbreaks of disease among unvaccinated children, including substantial containment costs (Alazraki, 2011). Wakefield moved to the United States where he became a director of an autism research center in Florida.

Diederik Stapel was a professor in cognitive social psychology and dean of the Social and Behavioral Sciences at Tilburg University in the Netherlands (Wise, 2011). Stapel examined discrimination, stereotyping, and advertising effectiveness in studies of advertising and social psychology. Stapel believed that the power of racial stereotyping could influence people’s views of themselves. His study results were widely shared with the public via the media. Stapel’s studies with collaborators included made-up data and manipulated results from fabricated experiments (Kraut, 2011; Vogel, 2011). In 2011, three junior researchers reported their suspicions concerning one of Stapel’s studies (Vogel). Then an investigation committee found that Stapel fabricated data in his publications and that many of the doctoral theses he had supervised were fraudulent (Carey, 2011; Vogel, 2011). Stapel relinquished his doctoral degree from the University of Amsterdam (Enserink, 2011) and was fired from Tilburg University (Dutch social psychologist found to have faked data, 2011).

These cases represent some of the most egregious forms of research misconduct, notably fabrication and falsification. Most of them involve multiple forms or instances of misbehavior. In some, but not all, of these cases, the misconduct ends the perpetrator’s career in science, especially in research.

The Prevalence of Research Misconduct

Determining how much research misconduct occurs has been an elusive goal. All estimates obtained by indirect means support the conclusion that the federally recognized forms of misconduct are not pervasive (though other questionable research practices are apparently common; see below). Even if the rarity of misconduct is indeterminate, its other characteristics confound analysis. It is covert, by its very nature. It is hard to measure quantitatively. It is difficult to specify, recognize, and verify. Some unknown proportion of instances can be explained away by circumstances involved. Nonetheless, efforts to estimate prevalence have yielded statistics that give a sense of the order of magnitude of the problem, within a rather broad range.

Perhaps the most direct means of measuring the prevalence of misconduct in science is by anonymous self-reports from scientists concerning their own behavior.

In a large-scale, anonymous survey of early- and mid-career scientists funded by the National Institutes of Health, Martinson et al. (2005) found frequencies of under 2% for self-reported fabrication, falsification, and plagiarism within the previous 3 years. In other studies with smaller and less widely representative samples, scientists admitted to engaging in fabrication, falsification, or plagiarism at rates varying from 1 to 7% (Eastwood et al., 1996; Gardner et al., 2005; Geggie, 2001; Henry et al., 2005; Kalichman & Friedman, 1992; List et al., 2001). In a meta-analysis of surveys that had asked scientists directly about their own behavior or the behavior of their colleagues, Fanelli (2009) found that a pooled weighted average of 1.97% of respondents admitted to having at least once fabricated, falsified, or modified data.

Numerous surveys have also asked scientists about behaviors that do not meet the federal definition of misconduct, but seriously compromise the integrity of research (see Fanelli, 2009). In the Martinson et al. (2005) study, 33% of respondents reported that, within the past 3 years, they had engaged in at least one type of misconduct or other misbehavior viewed by compliance officers as serious, such as circumventing aspects of human subjects requirements (7.6%), overlooking others' use of flawed data or questionable interpretation of data (12.5%), or changing significant aspects of the study in response to pressure from a funding source (15.5%). Fanelli's (2009) meta-analysis found that 33.7% of the respondents in past surveys had admitted engaging in questionable research practices. In smaller studies representing various disciplines, scientists report engaging in variously defined questionable research practices at rates varying from 32% for medical specialists in Australia (Henry et al., 2005) to 47% for community research workers in the USA (True, Alexander, & Richman, 2011).

Although asking scientists about their own behavior is the most direct way of measuring the extent of misconduct, it has its limitations. As Anderson (1999) points out, "those who know most about misconduct are the least likely to give information about it" (p. 301), which may lead to response bias. Authors of self-report studies note that their findings likely underestimate the actual prevalence of integrity problems (e.g., Martinson et al., 2005).

Another way of measuring the prevalence of misconduct involves asking scientists to report on their colleagues' behavior – an approach taken in several early studies (e.g., Bebeau & Davis, 1996; Glick & Shamoo, 1994; Greenberg & Goldberg, 1994; Meyer & McMahon, 2004; Swazey et al., 1993). Reports on the behaviors of others have typically yielded higher rates of misconduct than self-reports. In one study of attendees at a conference on research policies, 86% of the participants reported that their colleagues had engaged in questionable research practices at some point in their careers (Glick & Shamoo, 1994). Ranstam et al. (2000) surveyed members of the International Society for Clinical Biostatistics and found that 51% of respondents said they knew of a fraudulent project in their personal proximity in the last 10 years. Fanelli (2009) found that, in surveys that asked about the behavior of colleagues since 1987, the rate of falsification was 14.12%, and the rate of questionable research practices was 72%.

High rates of reported misconduct have led to suggestions that known instances of misconduct represent merely the tip of the iceberg. However, some studies that asked about the behavior of colleagues had no controls for the possibility of duplicate reporting, so two people might have reported on the same person or event. Titus et al. (2008) attempted to eliminate the possibility of duplicate reports in their recent study of NIH-funded scientists by selecting only one researcher in a given department and asking the respondent to report only on suspected misconduct observed in that department in the past 3 years. They found that over that time period, 2,212 respondents observed 201 cases of misconduct, or the equivalent of 3 cases per 100 people per year (Titus et al., 2008). Using the conservative, simplifying assumption that people who did not respond to the survey did not observe misconduct, they estimated a minimum of 2,325 observations of research misconduct each year among scientists funded by the NIH.

The conclusions of Titus et al. (2008) suggest a discrepancy between the experiences of scientists and federal misconduct statistics. Fifty-eight percent of the observed incidents were claimed by participants to have been reported, meaning that 1,350 cases would have been reported to authorities over the course of 3 years. The two agencies that oversee most misconduct cases in the USA, the National Science Foundation (NSF) and the Department of Health and Human Services (HHS), typically report only 20–30 cases each year (National Science Foundation, Office of Inspector General, 2011; Reynolds, 2003; Rhoades, 2004). In 2011, NSF and HHS each confirmed 13 cases of misconduct (National Institutes of Health, 2011; National Science Foundation, Office of Inspector General, 2011). Steneck (2006) has estimated that these rates represent less than .001% of all scientists in the United States, or about one case for 100,000 researchers. If the conservative projections of Titus et al. (2008) are correct, government agencies confirm less than 1% of the misconduct observed by scientists.

Government statistics have sometimes been used to support lower estimates of misconduct than those suggested by survey research, but they capture only the cases of misconduct that are reported and investigated by institutions. A number of studies indicate that scientists do not report misconduct they know about (Jacobsen & Hals, 1995; Ranstam et al., 2000; Wenger et al., 1997). They often fear repercussions, retaliation, or time lost on a misconduct investigation. Braxton and Bayer (1996) found that, in the field of biochemistry, fear of retaliation for whistle-blowing leads to little or no action when cases of misconduct are known. The threat of retribution is particularly relevant to graduate students and junior researchers. In one study, 53% of the respondents who were graduate students in four disciplines said that they could not report cases of suspected misconduct without expecting retaliation (Anderson, Louis & Earle, 1994). Such findings support the argument that government statistics of confirmed cases “notoriously underestimate the size of hidden populations and the extent of deviant activities” (Lee, 1993).

The prevalence of misconduct can also be estimated by the available data on retractions of fraudulent papers from the research literature and by the rates at which research is rejected by journal editors due to fraud. Retraction is a process described by Budd, Sievert, & Schultz, (1998) as the scientific equivalent of recalling a flawed industrial product. A few studies have found that the percentage of retracted papers

has been on the rise in the major biomedical databases and stands at about 1% (Cokol, Iossifov, Rodriguez-Esteban, & Rzhetsky, 2007; Corbyn, 2009; Steen, 2010). The rates of retraction for scientific journal articles in *PubMed* have increased tenfold over the past two decades (Steen). Between 2000 and 2010, 197 papers were retracted from *PubMed* for falsification, fabrication, or plagiarism of data (Steen). A study that analyzed 312 of the 529 retractions in *PubMed* from 1988 to 2008 found that 25% of articles were retracted due to fabrication, data falsification, or plagiarism; 17% to redundant publication; 5% to disputed authorship or data ownership; and 4% to inaccurate or misleading reporting (Wager & Williams, 2011). Of course, not all fraudulent articles published in the scientific literature are retracted; it has been estimated that 0.02–0.2% of papers in the research literature are fraudulent (Claxton, 2005). Despite the increasing sophistication of detection software, plagiarism is the most widespread issue, with close to 3,000 citations appearing in the biomedical literature each year that are “highly similar to citations in previously published manuscripts” (Garner, 2011, p. 95).

What retraction rates fail to capture is the incidence of fraud in papers submitted to journals and rejected in the course of review. Known rates of fraudulent submission vary widely by journal and field. Some are similar to the percentage of articles subsequently retracted from the literature; for instance, editors of the *Journal of Cell Biology* found that 8 of 800 submissions (1%) included improperly manipulated images (Rossner & Yamada, 2004, cited in Steneck, 2006). Some reported rates are much higher. Of 754 manuscripts submitted to the *Croatian Medical Journal* in 2009 and 2010, 85 (11%) were confirmed to have at least 10% plagiarized text (Bazdaric, Bilic-Zulle, Brumini, & Petroveck, 2011). A 6-month study of three Taylor and Francis science journals using detection software found that editors had to reject 6, 10, and 23% of manuscripts because of suspected plagiarism (Butler, 2010).

Although the extent of misconduct is notoriously difficult to measure, it is clear that serious breaches of research ethics are not restricted to vanishingly rare cases. Why does misconduct occur?

Factors Associated with Research Misconduct

As the prevalence of misconduct is difficult to measure, so are its causes. No studies have yet been devised or attempted to determine the causes of misconduct. There are, however, analyses that suggest what factors – psychological and environmental – are associated with misconduct.

Explanations of why scientists commit misconduct tend to draw on three broad theories: trait theories, rational choice theories, and social context theories. (These correspond somewhat roughly to Zuckerman’s (1988) categories of individual psychopathology, alienation due to the industrialization of science as represented in conflict theory, and the competitive drive for originality and recognition as represented in anomie theory.) These theories propose differing conceptualizations of the relationship between the two set of factors that influence dishonest behavior, those associated with the individual and those in the environment or situation.

Trait Theories

One way to view the origins of misconduct is to examine the characteristics of individuals who exhibit dishonest behavior. Trait theories look for causes of misconduct in the characteristics and tendencies that dispose perpetrators to unethical behavior (Murphy, 1993). This approach has been evident in the typical reactions of the media and the scientific community to misconduct scandals. They have often pointed to miscreants' mental aberration or imbalance to explain the misconduct. Those who commit misconduct are sometimes portrayed as not being *true* scientists (Kreutzberg, 2004), because their behavior is inconsistent with accepted norms and the demands of the scientific method. Trait theories have also been popularly used in the broader literature on integrity in the workplace (Kidder, 2005), and they inspired a variety of tests used by some employers to identify individuals who might be likely to engage in dishonest behavior (Murphy, 1993).

To date, few empirical studies have offered conclusive evidence regarding the relationship between individual traits and the unethical behavior of scientists. Most of the available evidence concerns ethical decision-making. Recent studies have examined personality characteristics that predict ethical decision-making, assuming that it is a "direct antecedent of ethical behavior" (Antes et al., 2007, p. 15). Mumford et al. (2006) developed a measure of ethical decision-making used in simulation of people's responses to ethical dilemmas in academic work. A study of doctoral students in the health sciences, biological sciences, and social sciences by Mumford, Antes and colleagues found that openness and agreeableness were moderately correlated with the metacognitive strategies associated with ethical decision-making (Antes et al., 2007; Mumford, Connelly et al., 2009). They also found, however, that narcissism and cynicism played greater roles in ethical decision-making than more basic personality traits. These two traits were found to be more consistent predictors of unethical decision-making on the scenario-based test than neuroticism, the strongest predictor of all the basic personality traits measured (Antes et al.).

Studies of traits that affect misconduct consistently suggest that traits associated with misbehavior, such as narcissism and cynicism, are not limited to a narrow proportion of the population but rather widely distributed and possibly developed over time. Even from the standpoint of trait research alone, therefore, misconduct cannot be assumed to be a matter of "the mental imbalance of a few individuals" (Broad & Wade, 1982).

Trait studies contribute valuable insights, but they do not account for the environmental influences that lead people to act contrary to their preferences or beliefs. Trait approaches have been accused of ignoring situational variables that might affect behavior (Davis-Blake & Pfeffer, 1989). Trait studies are also limited by their dispositional nature, in that they do not account for the fact that qualities and predispositions are distinct from the actual behavior of subjects.

Rational Choice Theories

The standard rational choice view of misconduct rests on the assumption that scientists are rational and self-interested beings driven by the desire and capacity to maximize their rewards. Merton (1973) noted that the effectiveness of the entire scientific endeavor depends on the sensitivity of scientists to its unique rewards, which are primarily non-monetary in nature. In science, the “coin of the realm” (Merton, 1942) is the credit for intellectual accomplishment. In fact, scientists forego a “compensating differential” (Stern, 1999, p. 28) to hold jobs that allow them the freedom and flexibility to do original research.

From a rational choice perspective, scientists’ decisions depend on the anticipated costs and benefits of various behaviors. When they act with integrity, it is because the benefits of such behavior (e.g., the possibility of a boost in reputation or position) outweigh the costs (e.g., the risk of losing a grant or being otherwise punished). The higher the payoffs and the lower the costs of dishonesty, the more likely it is that an individual will cheat (Lewicki, 1983). It is therefore assumed that behavior can be predicted and regulated through a system of incentives and punishments.

Rewards of Cheating

Publication in peer-reviewed journals is a primary means of obtaining recognition of scientific accomplishment, and the temptation faced by scientists is to get ahead faster by buying “valid currency on the black market” (Riis, 2001, p. 7), that is, inflating numbers of publications on a curriculum vitae. The temptation is heightened by the reality that only a select proportion of scientists trained are able to attain prestigious, tenured positions and develop independent research trajectories. An environment with an oversupply of scientists competing for limited resources “fosters intense competition by amplifying small differences in productivity into large differences in recognition and reward” (Freeman et al., 2001, p. 2293). Disproportionate incentives to win in what Freeman et al. describe as the *tournament* of contemporary science may be associated with questionable research practices such as sabotaging the work of others, interfering with the peer-review process, and cutting corners.

There is some evidence to suggest that the disproportionate payoff of publishing in high-impact journals is related to misconduct. When Fang and Casadeval (2011) examined the retraction rates of 17 journals indexed in *PubMed*, they found a strong correlation between a journal’s impact factor and its retraction index (computed as the number of retractions in the journal from 2001 to 2010 multiplied by 1,000 and divided by the number of articles published in the journal). Steen (2010) also found that papers retracted specifically for fraud were significantly more likely than those retracted for error to appear in journals with high-impact factors ($p < 0.0001$). Although some of the difference in retraction could be attributed to greater publicity

and scrutiny of publications in high-impact journals, some evidence suggests that they also tend to have more thorough peer review and stronger ethic requirements (Charlier et al., 2011). Researchers interpret these findings by pointing to the high rewards associated with publishing in high-impact journals as fueling unethical behavior (Fang & Casadevall).

Costs of Honesty

Misconduct may also be driven by the costs of honesty. Some journals may in effect penalize honest reporting of research by demanding clean and definitive reports that do not reflect how science is actually done (Fanelli, 2010). Scientists are under pressure to produce a steady stream of publishable results, yet meta-analyses have demonstrated that journals are less likely to publish papers whose results do not support the hypotheses tested (Dwan et al., 2008; Song et al., 2009). This kind of publication bias may contribute to practices such as not publishing negative results (Dickersin, 1997), publishing only selected results (Chan, Hróbjartsson, Haahr, Gøtzsche, & Altman, 2004), changing the hypothesis after the results are known (Kerr, 1998), or *fudging* the data to make the findings more acceptable (De Vries et al., 2006). It has been argued that the genre of high-impact journal articles is especially inconsistent with the messy affair of real-life science (Fang & Casadevall, 2011).

For researchers in some countries, the costs of honesty are driven up even further by external pressure to publish coupled with excessive instructional workloads. For instance, a study in Ukraine found that publication is a condition of continued faculty employment, but it cannot be reconciled with teaching loads and other responsibilities (Shaw, Chapman, & Rumyantseva, 2011). Such conflicting demands present academics with perverse incentives to engage in questionable research practices in order to keep their jobs. Governments around the globe increasingly expect universities to act as drivers of the knowledge economy, and some higher education institutions are passing the pressure on to faculty without matching the incentive structures to new expectations, with potentially troubling consequences for the integrity of research.

The risk of being caught is a factor in rational decisions to cheat (Becker, 1968), and the effectiveness of punishments in deterring misconduct depends on the degree to which they are enforced. The low frequency at which academic institutions report misconduct is due in part to the high financial and reputational costs to both individuals and institutions. Misconduct investigations are costly in terms of money, time, and effort. Michalek, Hutson, Wicher and Trump (2010) estimated that one misconduct investigation cost their institution over one million dollars in direct and indirect costs.

Social Context Theories

A third set of theories regarding the origins of misconduct focuses on interactions between the individual scientist and the research environment. For example, the role played by socialization in science has long been the subject of sociological study (Hagstrom, 1965; Merton, 1973). In recent years, socialization theories have advanced,

for example, through investigations of how internal and external reward mechanisms influence behavior. Though not specifically addressed at scientific researchers, experimental research in economics has provided evidence that people in general exhibit consistent preferences for reciprocity and altruism that appear irrational from a purely rational choice standpoint (Andreoni & Miller, 2002). People choose to reward collaborators and reciprocate, even when doing so is not in their best interest, pointing to a complex relationship between internal and external reward systems. In experimental studies, participants' compliance with social values activated the pleasure center in the subjects' brains that also responds, for example, to the expectation of monetary gain (Rilling et al., 2002). A study of subjects from 15 cultures demonstrated that internal reward mechanisms vary by society, and socialization is the key determinant of internalized normative systems (Heinrich et al., 2001).

Increased recognition of the role of social context in understanding behavior informed early studies of the relationship between the socialization of scientists and their ethical conduct (Anderson & Louis, 1994; Anderson et al., 1994; Louis, Anderson, & Rosenberg, 1995). Consistent with the tenets of socialization theories, researchers have found that exposure to the misconduct or misbehavior of others influences one's own ethical conduct or decision-making. For example, among students, Feudtner and Christakis (1994) found that exposure to unethical events raises the likelihood that they will behave unethically, compromise their ethical principles, and feel guilty. Another study of doctoral students in three fields reported that exposure to unethical events was negatively related to ethical decision-making in simulation scenarios (Mumford, Waples et al., 2009). Braxton found that deviation from the norms of science was influenced by the extent to which individuals perceived that their disciplinary colleagues violated the norms of science (Braxton, 1990).

Gino, Ayal, and Ariely, (2009) outline three explanations of why unethical behavior might be contagious. These findings, though not specifically oriented to scientists, may still be instructive about human behavior. First, observing others who act dishonestly with no consequences may lead individuals to lower their estimates of the likely cost of cheating (a rational choice argument). Second, seeing dishonest behavior may change how an individual classifies that behavior and decides whether or not moral standards are salient to the situation. Third, others' unethical behavior alters the perception of social norms in a given community, especially when it is displayed by a person perceived as a member of the individual's "in-group" (Gino et al.).

Social norms have been found to play an especially significant role in scientific communities. Scientists' normative stances are shaped by the mentorship networks, work environments, and social systems in which they function. There is evidence to suggest that the norms of scientific workplaces are sometimes ambiguous and contradictory. A study of NIH-funded scientists found that participants displayed high levels of normative dissonance, that is, the perception of gaps between norms to which respondents subscribed and the typical behavior of other scientists in their immediate environment (Martinson et al., 2006). Although researchers espouse the traditional norms of science to a significant degree, they perceive the behavior of their colleagues as "highly counternormative" (Martinson et al., 2006, p. 7). The impact of institutional norms on observed behavior was also suggested by an

earlier survey of risk scientists, which reported that researchers who work in for-profit organizations are more likely to observe scientific misconduct than their counterparts who work in state government, a discrepancy that the researchers attributed to the norms associated with the “profit-oriented industrial activity” (Greenberg & Goldberg, 1994, p. 234).

Studies that examine links between the environment and misconduct have found associations between misconduct and three general environmental factors that are related to the ethical behavior of scientists: organizational climate, organizational injustice, and mentoring.

Organizational Climate

Multiple studies have determined that one of the strongest predictors of scientific misconduct is organizational climate at the institution or in the department where scientists work. A study of doctoral students in three fields reported that organizational climate significantly impacts ethical decision-making (Mumford, Connelly et al., 2009). Mumford, Waples et al. (2009) found that doctoral students’ exposure to unethical behaviors in their daily work was negatively correlated with their ethical decision-making on a scenario-based test. A report from the Institute of Medicine (2002) cites evidence that organizational environments with “reward systems based on self-interest and commitment only to self rather than to coworkers and the organization are negatively associated with ethical conduct” (p. 58).

Competitive environments are linked with misbehavior in science (Anderson et al., 2007). In a study of graduate students in four disciplines, Anderson et al. (1994) found that a competitive climate is positively associated with observed misconduct. Being in a department that values individual over collaborative research also increased the likelihood that a student would observe research misconduct over time. (See also Louis et al., 1995). Blumenthal et al. (2006) confirmed the impact of competition on the likelihood of misbehavior in a study of geneticists and other life scientists. They found that scientists in high-competition fields are more likely than others to withhold data and results from others.

Organizational Injustice

The literature on organizational justice suggests that ethical conduct can be dependent on perceptions of procedural justice in an organization, that is, the fairness of the procedures used to arrive at decisions about distribution of resources and rewards in the organization. When people perceive as unfair the processes used in decisions about the distribution of resources, they may compensate by engaging in harmful behaviors (Skarlicki & Folger, 1997; Tyler & Blader, 2003). It has also been demonstrated that the relationship between perceptions of justice and behavior is mediated by social identity, the position of an individual in a social group (Blader & Tyler, 2003; Tyler & Blader, 2003). If a working environment is perceived as unjust, individuals’ sense of

security in their own position is undermined, which may prompt unethical behavior (Blader & Tyler; Tyler & Blader). Perceived injustice has an especially pronounced impact on those who do not feel secure or certain in their social identity.

A study of NIH-funded scientists confirmed that perceptions of procedural injustice are positively associated with self-reported misbehavior (Martinson et al., 2006). Perception of unfairness in how one's efforts are rewarded is more likely to lead to misbehavior among early-career researchers than among mid-career researchers, and the positive association between misbehavior and organizational injustice is likewise greater for the early-career group (Martinson et al., 2006). This finding is reminiscent of Braxton's (1993) earlier study that found that faculty who are alienated from the academic reward systems are more likely to deviate from the norms of science.

Mentoring

A number of studies have demonstrated that levels of misconduct observed by students are related to the mentoring they receive. Given mentoring's critical role in preparing researchers, this factor deserves attention. A 2007 study (Anderson et al.) examined training and mentoring in the responsible conduct of research in relation to research integrity and misbehavior, based on a survey of early-career and mid-career researchers who were receiving funding from NIH. Logistic regression analysis was used to analyze the data, controlling for gender, type of degree, and field of study. Mentoring had both positive and negative relationships to misbehavior: mentoring in ethics and research was associated with lower levels of misbehavior, while mentoring in financial issues and professional survival was associated with more misbehavior.

Studies also suggest that students and junior scientists are exposed to misconduct but often unable to discuss it openly with a mentor, producing an environment in which they may grow in ambivalence toward the values of the academic profession (see discussions in Anderson et al., 1994; Anderson, Horn et al., 2007; Anderson et al., 2007). As many as 77% of respondents in one of the studies claimed that their departments were not very or not at all active in preparing them to deal with ethical issues in their field (Anderson et al., 1994). Some types of mentoring are actually associated with decreased ethical reasoning. In one study, ethical decision-making among students in the health sciences decreased with experience in their graduate program (Mumford, Connelly et al., 2009).

Consequences of Research Misconduct

Unfortunately, some researchers – prompted by individual or social factors and undeterred by potential risks – do commit misconduct. In some instances, the reasons for the misconduct are simple, such as a desire to get ahead or a careless disregard

for rules. In others, the motivations behind the misbehavior are inscrutable. Covert misconduct can become a nagging concern for the person involved because of the possibility of eventual discovery, or it may be part of a series of actions (e.g., lies, cover-up) that build momentum over time and lead to further complications.

People who suspect or confirm misconduct by a colleague do not always report it. In many cases, misconduct goes undetected and uninvestigated, as suggested in the discrepancy cited above between the prevalence of researchers' self-avowed misbehavior and the number of cases handled annually by federal offices. Issues of hierarchy and power make junior colleagues hesitant to report suspected misbehavior, particularly when the miscreant holds the keys to the other's career. Even though whistle-blowers are protected by university policies, as mandated by the federal government (see below), an accusation may call the complainant's credibility or motives into question. Those who are aware of misconduct may be unwilling to disrupt collegial, collaborative relations or to mar a researcher's reputation and career.

Nonetheless, recent research has shown that peers may be able to deflect misconduct by simple, informal interventions (Koocher & Keith-Spiegel, 2010). The study that gave rise to this conclusion (Koocher, Keith-Spiegel, Tabachnick, Sieber, & Butler 2010) found that one-third of 2,599 respondents had not taken action on what they suspected to be misconduct. Furthermore, 40% of those who did not take action, despite direct evidence of misbehavior, still felt misgivings, even years later. Intervention was more likely if the potential accuser had higher status than the perpetrator, had less regular contact with the wrongdoer, had good information as a basis for action, saw the wrongdoing as unintentional, felt a personal responsibility to maintain standards, or saw themselves as implicated in some way. This study led to the development of a guide to responding to wrongdoing (Keith-Spiegel, Sieber, & Koocher, 2010) that presents many alternative courses of action. Administrators, also, may find it advisable to take cautious and informal approaches to allegations of misconduct (Loui, 2002; see also Gunsalus, 1998).

When the integrity of a research project is called into question, usually through some form of whistle-blowing, officials must decide how to proceed. Suspected misconduct triggers institutional policies and processes. In cases that involved federal funding, the institution is obliged to follow proper procedures to determine whether or not misconduct actually occurred. In other cases, institutional rules may still lead to an investigation. The process has three stages, both in general terms and as specified by the procedures of the NSF's Office of the Inspector General (www.nsf.gov/oig/officeofinvestigations.jsp): inquiry, during which allegations and preliminary evidence are examined to see if there are sufficient grounds for moving forward with an investigation of the case; investigation, during which all relevant evidence and the statements of all parties involved are formally examined; and adjudication, during which a conclusion is reached and sanctions, if appropriate, are imposed. Investigations are usually carried out by the employing research institution(s), with subsequent reports submitted to and reviewed by the granting agency. The processes used by institutions are sometime portrayed in flowcharts, as at the University of Nebraska (www.unl.edu/asenate/researchmisconductpolicy.pdf), the University of Minnesota

(www.policy.umn.edu/prod/groups/president/@pub/@policy/@esl/documents/policy/academicmisconduct_appc.pdf), and the University of South Alabama (www.southalabama.edu/researchcompliance/pdf/flowchartallegations.pdf).

Sanctions may be imposed by the federal granting agencies on the individuals involved. According to the *Office of Research Integrity Annual Reports* and the *Semiannual Reports to Congress* of the National Science Foundations' Office of the Inspector General, researchers may be debarred from receiving agency funding for a number of years or excluded from participation in the agency's activities such as review of proposals or service on advisory panels. They may be required to issue letters of correction or requests for retraction to journals that published tainted research studies, sometimes with the added provision that they clarify the roles of all coauthors so as to clear the names of innocent colleagues. They may also be required to participate in research ethics training, sometimes as an instructor of a course on the responsible conduct of research. Researchers' employing institutions may impose further penalties, including dismissal from the institution and reimbursement of costs associated with the misconduct.

Research institutions may themselves be subject to government sanctions when a researcher is found guilty of misconduct. They may be required to return research funding, develop better systems of oversight and compliance, or institute improved methods of providing training in the responsible conduct of research. Journals are responsible for correcting the research record, by issuing retractions or *errata* notices (Neale et al., 2007).

Proven misconduct, even of the most egregious kinds, does not always bring a research career to a close. The specific cases reviewed in this chapter indicate that some researchers found guilty of misconduct are able to continue their scientific work, usually in a different setting. A study by Redman and Merz (2008) found that out of all academic scientists found guilty of misconduct between 1994 and 2001, whom the researchers could trace, 43% were still working in academia by the time of the study, and 51% continued to publish at least one paper per year since being found guilty. Research universities are not always able to find out about previous misconduct of candidates for research positions. Though some federal agencies make findings of misconduct a matter of public record, investigations in some cases fall under confidentiality provisions of employment contracts, and so researchers are able to move on to another site where their past misdeeds are unknown.

Efforts to Promote Integrity and Deter Misconduct

Institutions and federal agencies have employed several approaches to ensuring the integrity of research. Perhaps the most visible is the development of a regulatory infrastructure through policies, compliance requirements, and oversight mechanisms. Normative pressure has also been exerted by institutions and disciplinary organizations, which have also taken more formal steps through issuing codes of

conduct. Training has been another key element, not only among graduate students but also among faculty who may be required by their institutions to keep up to date on federal regulations.

Regulation

The federal government's development of regulatory mechanisms has run parallel to universities' own efforts to regulate research done by their faculty. Universities are subject to oversight and reporting mandates, such as the appointment of an institutional research integrity officer who is responsible for government institution communication on integrity issues.

Compliance with federal regulations is critically important, as federal agencies have the authority to close down research projects or even entire university research systems, as happened in the case of human subjects problems at Johns Hopkins University (Keiger & De Pasquale, 2002). Institutions must therefore act in accordance with federal policies that detail how allegations and investigations of misconduct are to be handled and reported, how whistle-blowers are to be protected, and how training is provided to students and others working on federally funded projects (ori.hhs.gov). For example, with regard to protecting whistle-blowers from retaliation, the Public Health Service Policies on Research Misconduct (42C.F.R. 93) requires institutions to take "all reasonable and practical efforts to protect or restore the position and reputation of any complainant, witness or committee member and to counter potential or actual retaliation against these complainants, witnesses, and committee members" (ori.hhs.gov/retaliation-complaints).

In addition, universities are required to have in place institutional policies for responding to allegations of research misconduct, which are subject to federal review (ori.hhs.gov/institutional-policy). These policies may specify additional rules for their institution's faculty to follow.

Normative Pressure

A less formal approach to promoting integrity and deterring misconduct is through normative pressure among researchers and their affiliated units or organizations. Norms are "collective expectations for and understandings of appropriate and desired behavior within a given social system" (Anderson et al., 2010). They exert a form of peer pressure on members of the social system to behave properly or risk censure and expulsion from the group.

The classic formulation of norms in science was presented by sociologist Robert Merton (1942). The four norms in his system all have relevance to ensuring the integrity of research. *Universalism* is the principle that researchers' findings and career productivity should be judged on the basis of merit, not on the researchers'

reputations or other irrelevant characteristics. Plagiarism breaks the link between a researcher's work and proper assessment of the work, thereby violating this Mertonian norm. *Communality* (or communism, in Merton's original formulation) is the principle that scientific results and methods are appropriately owned by the scientific community and should therefore be shared. This norm is violated when scientists refuse to share the products of their research or the details of their methods with others. *Disinterestedness* requires scientists to reject motivation derived by self-interest. This norm counteracts pressures to advance one's own career at all costs, which drive the competitive environment in which misconduct arises. Finally, *organized skepticism* is the requirement that scientific findings be subject to scrutiny by knowledgeable peers. This norm reflects the process by which scientific misconduct may be detected.

Since Merton's seminal paper, other norms have been added to this list (see, e.g., Anderson et al., 2010; Resnik, 2007). The normative environment, encompassing the prevailing norms of a field of study or research team, exerts control through the expectations of one's peers and supervisor. As long as the norms reflect high ideals and people in the environment subscribe to the norms, the overall pressure is salutary as a means or reinforcing responsible conduct.

In some environments, however, scientists perceive dissonance between the norms as ideals and the behavior of their colleagues (Anderson et al. 2007). Such dissonance can attenuate the effectiveness of norms as a means of ensuring integrity in research.

Codes of Conduct

Codes of conduct constitute another means of promoting research integrity. They define common standards and set expectations for members or employees of an organization. A code is the most explicit statement of the norms that the organization considers essential for its "collective conscience" (Frankel, 1989, p. 110). Codes of conduct rely on the authority of the sponsoring organization, which is expressed through leaders' endorsement of the code or a formal vote by the membership. They differ from other kinds of policies and regulations; however, in that they typically involve less enforcement structure, sometimes none.

Standards of research integrity often appear in institutional codes of conduct, as well as in codes endorsed by scholarly societies or governmental agencies. Depending on their purpose and audience, codes differ widely in their scope, format, and practical use. The purpose of most codes is to improve the behavior of the relevant organization's members. Many codes are oriented at least in part to the broader community as a symbol of the organization's ethical legitimacy.

Differences in purpose define various categories of codes (Bullock & Panicker, 2003; Frankel, 1989; Moore, 2006), all of which are represented among codes of conduct for research. Frankel identifies three types of codes that take different approaches to promoting responsible behavior. *Aspirational* codes, described as

taking the *high road*, are intended to inspire people toward greater integrity by presenting ideals of good behavior. By contrast, *regulatory* or *low road* codes describe minimal expectations that the members of an organization must meet to avoid sanction. Regulatory codes are more likely than aspirational ones to specify procedures for handling misconduct. Bullock and Panicker (2003) draw a distinction between enforceable and non-enforced codes, depending on the inclusion or inclusion of procedures for sanctioning misconduct. *Educational* codes, sometimes described as a special class of normative codes, have the same purposes, but with an additional emphasis on teaching newcomers about the norms and standards they will be expected to meet. A fourth type of code, *normative* codes fall between aspirational and regulatory varieties in that they include references to both ideals and minimal expectations (Anderson & Shaw, 2012). The goal of normative codes is to describe how members of an organization must behave in order to be a part of the group, with exclusion from the group serving as the implicit punishment. Some codes are explicitly grounded in philosophical principles or scientific norms, whereas more pragmatic types focus on activities and responsibilities.

Anderson and Shaw (2012) have argued that “Good codes are written with a specific purpose, for specific subjects, by authors whose contributions enhance the codes’ legitimacy and effectiveness, and with deliberate attention to the appropriate grounding, scope, format and language” (p. 141). Who writes a code of conduct and how it is adopted have significant implications for its legitimacy in ensuring integrity. Management literature suggests that rank and file members of an organization should be involved in the code creation process for the sake of ownership of the code across the organization (Molander, 1987; Montoya & Richard, 1994). In some academic contexts, only a code written by the senior leadership will have legitimacy. Alternatively, in many academic societies, the members will only perceive a code as legitimate if they are given a chance to contribute to it or adopt it by a democratic vote. Involvement of all relevant stakeholders can be facilitated in a variety of ways, from open forums to focus groups (Davis, 2007, 2008). The principle of involving stakeholders in the development of an integrity code is consistent with the consensus in the literature on corporate codes that for a code to be a living document, there must be a sign-off process in place that ensures the organization’s members have seen and understood it (Pitt & Groskaufmanis, 1990; Schwartz, 2004).

Embedding a code of conduct in the daily life of the research institution is perhaps the single most important factor in determining its impact. Effective implementation of a code involves much more than distributing it throughout a university; it requires that the code be translated into concrete terms that are seen as meaningful for the daily actions of researchers. It has been suggested that such translation can occur through training sessions involving real ethical dilemmas (Nijhof, Cludts, Fisscher, & Laan, 2003). Frankel (1989) has also recommended that scientific codes of conduct be revised on a regular basis to reflect the changing ethical issues faced by scientists and maintain an ongoing conversation about the norms of the institution.

As Anderson and Shaw (2012) have pointed out, there are three challenges in the way research integrity is currently addressed in codes of conduct. First, codes of

conduct do not address research integrity adequately. Integrity is usually only one aspect of codes that typically cover a much broader scope of academic norms and behaviors, and it is often addressed through general admonitions against misconduct. For instance, the study of member organizations in the AAAS found that 51% of the respondents had a code that specifically addressed the collection, handling, reviewing, and reporting data, and only 36% mentioned the responsibility of authors on a publication (Iverson et al., 2003). Some academic societies do not address research integrity in their codes, and others, like the American Economic Association and the National Economic Association, do not have an official code at all (Anderson & Shaw, 2012; Enders & Hoover, 2004). Second, scientific collaborators from different disciplines or countries are often subject to different codes and policies. The *Singapore Statement* (www.singaporestatement.org), issued as an outcome of the Second World Conference on Research Integrity in Singapore in 2010, presents integrity principles and responsibilities applicable to researchers worldwide and serves as a guide to organizations that wish to develop more specific and localized codes and policies. Third, codes of conduct addressing research integrity are too often “dead on arrival” (Anderson & Shaw, 2012, p. 143), that is, buried away in institutional archives and ignored.

Training

Training is a necessary, if not sufficient, condition for compliance with ethical standards and norms. Socialization in graduate school is a classic mechanism supporting the deterrence of misconduct, particularly given evidence that incoming graduate students have inadequate knowledge of the responsible conduct of research (Heitman, Olsen, Anestidou & Bulger, 2007). Ongoing training is important throughout researchers’ careers, as rules and policies are updated and new technologies give rise to new ethical complications.

In the late 1970s and early 1980s, in response to public criticism resulting from high profile misconduct cases, formal training in research ethics began to emerge in research institutions, as a means of addressing and regaining public trust (Steneck & Bulger, 2007). The 1990s saw substantial, decentralized growth in the development of education in the responsible conduct of research (RCR). It began with the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration, which required grantees to complete formal training programs as a condition of grant awards (Steneck & Bulger).

In 2006, the White House Office of Science and Technology Policy issued a policy that provided basic guidelines for federal agencies and research institutions and expanded the scope of the fields required to provide training on responsible conduct of research to include economics, education, linguistics, psychology, social sciences, and statistics (Bulger & Heitman, 2007). In the following years, the NIH expanded its RCR instruction mandate to include fields outside of the natural sciences and strongly suggested that institutions offer the training to all graduate

and postdoctoral students. Colleges and universities are tasked with creating programs to provide their researchers with adequate training in RCR. The mandates allow for considerable flexibility in how a specific training program would be developed and implemented.

As of 2009, the National Science Foundation requires that “each institution that applies for financial assistance from the Foundation for science and engineering research or education describe in its grant proposal a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate students, graduate students, and postdoctoral researchers participating in the proposed research project” (America COMPETES Act, 42 U.S.C. 1862o-1). In 2010, the National Institutes of Health updated their policy on responsible research, specifying that “all trainees, fellows, participants, and scholars receiving support through any NIH training, career development award (individual or institutional), research education grant, and dissertation research grant must receive instruction in responsible conduct of research” (NIH, 2009). The revisions to these policies are designed to increase responsible research through additional accountability, transparency, and oversight measures.

Assessments of the early RCR instructional programs were mixed. Mastroianni and Kahn (1999) found a haphazard array of training programs that often failed to offer consistent content, clear goals, or effective outcomes and often did not apply to graduate student trainees. In the decade since Mastroianni and Kahn released their study, new methods in RCR training have emerged, but research suggests that there is still a good deal of variability in both the process and the outcomes (Brock et al., 2008; Kalichman & Pelmmons, 2007; Plemmons, Brody, & Kalichman, 2006; Schrag, 2005).

The challenges of effectively educating scientists in the responsible conduct of research have been documented in a series of research studies. Kalichman and Plemmons (2007) set out to identify the course goals of RCR instructors. The results showed that 25% of the 50 instructors interviewed from NIH grantee institutions reported that they were not actually RCR instructors, despite having been identified as such on NIH grant applications. Additionally, 22% were unaware that there was a requirement for NIH grantees to receive mandatory training. On the positive side, 80% reported that at their institution RCR instruction was required for individuals other than NIH awardees; however, only 1 of the 50 instructors interviewed said that RCR courses were required of every researcher within the institution. The 50 researchers interviewed provided over 50 course goals for RCR education. The study raised questions and concerns about who is teaching RCR, what they are teaching, and even the way in which they approach instruction. The findings suggest that RCR instruction is so uneven that it would be inappropriate to expect consistent learning outcomes for trainees.

There is also a great deal of variability in instructional materials. DuBois, Heitman, Steneck, and Kon (2010) identified ways in which programs funded through the Clinical and Translational Science Award mechanism currently satisfy RCR requirements. Specifically, the authors wanted to identify who is included in RCR instruction, what are the commonly used training materials, and what is the content of those RCR training materials. The second purpose was to create a catalog

of RCR materials in use. Of 78 survey respondents, 50% use an online training system. Additionally, 13 of the 38 institutions represented in the study do not use a textbook for RCR instruction, and 14 identified one or more textbooks used for RCR instruction in a given course. Another 20 institutions use training material of their own creation. These results again suggest that there is no unified approach to RCR instruction. Variation exists in scope, content, and instructional approach. Delivery varies within institutions, and RCR instruction is rarely tailored to a specific field or project.

In 2008, Plemmons, Brody, and Kalichman examined students' perceptions of the effectiveness of RCR courses. Students in 11 courses taught at 11 different research universities were included in this study. The results showed that ethics instruction is effective in providing new information, but less effective in improving existing skills or changing previously held attitudes about RCR.

Other research groups have examined the influence of RCR education in ethical behaviors and decision-making. Brock et al. (2008) examined the role of sensemaking as an instructional approach in ethical decision-making. In this study, subjects participated in a 2-day sensemaking training program designed to engage participants in ethical decision-making scenarios. The results showed that sensemaking training can change the mental models and standard reasoning that individuals use to make a decision in order to help them make more ethically sound decisions.

In a later study, Antes, Wang, Mumford, Brown, Connelly, and Devenport (2010) evaluated the effects of RCR instruction on ethical decision-making. The authors examined key learning outcomes of responsible conduct of research courses, including ethical reasoning, social dimensions of ethical situations, and the making of ethical decisions. They found that ethicality of decisions showed no improvement after the RCR course, and ethical decision-making decreased in the categories of seeking assistance, considering multiple perspectives, and business aspects of research. Funk, Barrett, and Macrina (2007) likewise did not show an association between ethically appropriate behavioral responses and education in the responsible conduct of research.

In a more hopeful vein, a meta-analysis of effectiveness of instruction in RCR, based on 20 empirical studies (Antes et al., 2009), highlighted a series of effective best practices in RCR education. The study found that cognitive decision-making approaches are most effective, followed by approaches using ethical sensitivity instruction. The least effective programs focused on moral development, while the most effective programs focused on moral reasoning and decision-making. Engaging and interactive courses saw better outcomes than other approaches, and an especially effective technique was the use of reasoning errors in classroom discussion. Additionally, the study found that mandatory training is the most common way of addressing scientific misconduct. The meta-analysis also uncovered several factors that moderate instructional effectiveness, including participant characteristics, type of instruction, type of assessment, quality of instruction, and course content.

Given the need to provide RCR training to many students and faculty, research institutions have turned to online instructional providers. The Collaborative Institutional Training Initiative (CITI), developed in 2000, is the largest of these

providers and functions as an international resource for instruction in RCR (Braunschweiger & Goodman, 2007). Epigeum Ltd, in the UK, also offers RCR courses internationally. Some universities have developed their own online systems to provide at least part of their required RCR instruction.

Online RCR instruction can provide comprehensive and uniform training across disciplines, institutions, and countries, but it is not without criticism and drawbacks (Kalichman, 2005). Schrag (2005) explores the effectiveness of online instruction methods. Schrag points out that students in traditional classrooms also have the opportunity to learn how to engage in a professional dialogue regarding sensitive issues, like research misconduct and have a rich context for which. Schrag notes that web-based instruction offers some benefits that brick and mortar classrooms do not. For example, online instruction allows for flexibility in scheduling as well as greater uniformity in the curriculum (Schrag). The format of online instructional systems sometimes encourages learners to skim material quickly and complete the assessments provided without careful attention or thought. One might conclude then that online systems may be more effectively used in combination with face-to-face instruction.

Bulger and Heitman (2007) suggest that RCR instruction should change to a multilevel structure. The first level would provide generally applicable content across disciplines (e.g., generally accepted ethical guidelines). The second level would provide discipline-specific training. The authors also proposed that web-based RCR courses might reduce variability, as would development of a national RCR curriculum.

McGee, Almquist, Keller, and Jacobsen (2008) suggest moving to an extended time frame RCR training model, based on their interviews with 30 graduate and postdoctoral students at the Mayo Clinic College of Medicine. Their interviews covered, among other topics, disciplinary research norms, degree to which students accepted or rejected new ideas presented in the classroom, and participants' process of resolving issues for which there was no clear norm. The results were consistent with previous survey-based studies in that there was little influence from the RCR course on students' thought patterns about unethical behavior in research.

Mentoring

As noted above, mentoring as a component of the research environment is associated with misbehavior, but it is also an important part of efforts to promote integrity. Mentors play a significant role in socializing young researchers as responsible scientists. Norms of behavior in the discipline and in the immediate work context, the rules of publishing, career management, and proper research methods are often learned from an advisor, supervisor, or mentor. The mentor may or may not also serve as an advisor or supervisor and therefore may or may not have formal responsibility for a student's development and work.

Bird (2001) examined the roles of mentors in teaching the responsible conduct of research. Bird suggested that professional success requires an awareness and understanding of the standards, norms, and values of the professional community. Mentors are well positioned to play a formative role in developing that awareness and understanding through implicit and explicit examples of professionally acceptable behavior.

Fisher, Fried, and Feldman's (2009) study is based on results from a national survey of doctoral students in psychology. The key finding is that imparting research ethics to students through interaction with faculty mentors is better than instruction through RCR courses. The study examined the perceptions of psychology doctoral students regarding RCR, mentoring, department climate, preparation to conduct research ethically, and belief in the scientific integrity of psychology research. Topics included trainees' previous research experience, perceptions of RCR instruction through mentorship and role modeling, and departmental policies regarding RCR. This study's findings suggest that trainees need explicitly stated policies that are supported by mentors to feel well prepared to behave ethically in the field. These findings suggest that mentors have the opportunity to prepare graduate students through direct conversations and appropriate role modeling in research integrity.

Research has shown that a mentor can have a positive effect, and so it is reasonable to assume that not having a mentor may be detrimental to trainees' ethical development. Wright, Titus, and Cornelison (2008) examined 45 closed ORI cases from 1990 to 2004 pertaining to trainees' confirmed misconduct to see how involved their mentors had been in promoting responsible research practices. In all but three cases, fabrication, falsification, or both were involved, and 79% of the time the trainee's research was a joint project with a faculty member. The researchers identified the mentor in each case as the person the institution listed as the trainees' advisor. They explored three specific tasks that they believe fall under the purview of a mentor and should have been performed with trainees: periodic review of source data, clear explanations and expectations of research and acceptable research standards, and maintenance of a manageable level of stress in the laboratory environment. In 32 cases, the mentor never examined the trainee's raw data. In 62% of the cases, the mentor appeared to "have little awareness about the conduct of research they were presumably supervising" (p.329). Mentors who did not review source data tended to be the same group that did not set clear standards in the lab. No cases had enough data to determine whether or not stressful lab environments contributed to misconduct. The review involved only cases where misconduct occurred; the researchers were not able to access confidential cases where misconduct was alleged but not found. Case files did not specifically address the role of mentors, and so the researchers based their conclusions in part on inferences.

Fadan, Klag, Kass, and Krag (2002) argue in favor of scientists' participating actively in ethics education. The authors argue that RCR should not be viewed as a way to comply with federal guidelines, but rather as a way to act as socially responsible scientists. They further argue that it may be necessary to provide multidisciplinary base training with further training addressing more specific fields.

Directions for Future Research

Research integrity and misconduct receive far more attention in the popular press than in research studies. Scandals and major cases of research misconduct, like those noted above, draw the public's attention to science and its inner workings. They also frequently generate commentary and opinions. This attention does not, however, typically further the goals of understanding the origins of good and bad conduct, the best approaches to ensuring integrity, or the complications of emergent issues.

We suggest three potentially fruitful directions for future research. First, the literature would be strengthened by greater focus on actual research behavior. Studies based on scenarios or hypothetical situations may illuminate some aspects of research integrity, but there is a need for more analyses based in the practice of research and the behavior of scientists. Decision-making in laboratories, interactions of researchers within the research setting, and actual behavior that deviates from accepted practice should be studied to provide a better view of the realities of ethical challenges in research. Recent calls for *in situ* training (e.g., Grinnell, 2012) likewise suggest that training lacks immediacy and impact when it is separated from actual practice. Research on best approaches to the delivery of training and assessments of its effectiveness should also focus on behavior in the actual research context.

Second, there is a need for research on integrity in boundary-crossing collaborative projects. Most research reviewed here has focused on specific disciplines within a specific country or, in the case of national surveys, has typically paid scant attention to the influence of disciplinary and other sectoral differences. Research collaboration and the attendant ethical challenges become more complicated when several countries, disciplines, and sectors are involved (Steneck, 2010). Some aspects of research integrity, such as those represented in the *Singapore Statement*, are generally understood to be universal. Others, such as the assignment of authorship, vary (Anderson, Chiteng Kot, et al., 2011). What is common knowledge in one discipline may need to be cited and explained in another. Typical practice among chemists in terms of proposing and accomplishing research projects may not align with what a collaborating group of engineers considers appropriate practice. Norms of behavior within university settings may be either stricter or looser than those in corporate research settings. Further research is needed on the ethical complications arising in crosscutting, collaborative research.

Finally, among the most valuable prospective studies would be those that employ excellent assessment techniques to determine what works best in instilling appropriate knowledge, attitudes, and skills related to integrity in research. Educational efforts to ensure integrity are often disconnected from the outcomes of research behavior and have not been adequately assessed. The challenge here is difficult, as training programs differ widely and outcomes are difficult to measure. Still, the economic impact of exposed (or even covert) misbehavior suggests that better techniques for ensuring integrity need to be found.

Conclusion

The global research system is vast, and it can and does tolerate some level of error, inaccuracy, and questionable practice. Intentional misconduct and other behaviors that compromise the integrity of science are quite another matter. They can do great harm to the system by introducing falsehood and misrepresentation into a system based on the pursuit of truth. The scientific community and all related institutions have collective responsibility for exposing and eradicating misconduct and its effects on the research record by scrutinizing research and following up on suspicious activity. There is simply no better protection for the integrity of science than the careful and watchful commitment of researchers as they go about their everyday work (Anderson, 2007; Koocher & Keith-Spiegel, 2010). This is the responsibility of all researchers as the guardians of research integrity.

Endnote

1. We employ the term *scientific* to refer to disciplined inquiry in the broadest sense, and we use *research* and *science* interchangeably.

References

- Alazraki, M. (2011). The Autism vaccine fraud: Dr. Wakefield's costly lie to society. *Daily Finance*. Retrieved May 29, 2012, from www.dailyfinance.com/2011/01/12/autism-vaccine-fraud-wakefield-cost-money-deaths
- Altman, D. G. (1994). The scandal of poor medical research: We need less research, better research, and research done for the right reasons. *British Medical Journal*, 29, 283. doi:[10.1136/bmj.308.6924.283](https://doi.org/10.1136/bmj.308.6924.283).
- Anderson, M. S. (1999). Uncovering the covert: Research on academic misconduct. In J. M. Braxton (Ed.), *Perspectives on scholarly misconduct in the sciences* (pp. 283–314). Columbus, OH: Ohio State University Press.
- Anderson, M. S. (2007). Collective openness and other recommendations for the promotion of research integrity. *Science and Engineering Ethics*, 13(4), 387–394.
- Anderson, M. S., Chiteng Kot, F., Shaw, M. A., Lepkowski, C. C., & De Vries, R. G. (2011). Authorship diplomacy: Cross-national differences complicate allocation of credit and responsibility. *American Scientist*, 99(3), 204–207.
- Anderson, M. S., Horn, A. S., Risbey, K. R., Ronning, E. A., De Vries, R., & Martinson, B. C. (2007). What do mentoring and training in the responsible conduct of research have to do with scientists' misbehavior? Findings from a national survey of NIH-Funded scientists. *Academic Medicine*, 82(9), 853–860.
- Anderson, M. S., & Louis, K. S. (1994). The graduate student experience and subscription to the norms of science. *Research in Higher Education*, 35(3), 273–299.
- Anderson, M. S., Louis, K. S., & Earle, J. (1994). Disciplinary and departmental effects on observations of faculty and graduate student misconduct. *Journal of Higher Education*, 65(3), 330–350.

- Anderson, M. S., Ronning, E. A., De Vries, R., & Martinson, B. C. (2007). The perverse effects of competition on scientists' work and relationships. *Science and Engineering Ethics*, 13(4), 437–461.
- Anderson, M. S., Ronning, E. A., De Vries, R., & Martinson, B. C. (2010). Extending the mertonian norms: Scientists' subscription to norms of research. *Journal of Higher Education*, 81(3), 366–393.
- Anderson, M. S., & Shaw, M. A. (2012). A framework for examining codes of conduct on research integrity. In T. Mayer & N. Steneck (Eds.), *Promoting research integrity in a global environment* (pp. 133–148). Singapore: World Scientific.
- Anderson, M. S., & Shultz, J. B. (2003). The role of scientific associations in promoting research integrity and deterring research misconduct. *Science and Engineering Ethics*, 9(2), 269.
- Anderson, M. S., & Steneck, N. H. (Eds.). (2011). *International research collaborations: Much to be gained, many ways to get in trouble*. New York: Routledge.
- Andreoni, J., & Miller, J. (2002). Giving according to garp: An experimental test of the consistency of preferences for altruism. *Econometrica*, 70(2), 737–753.
- Angier, N. (1990, April 24). Cultures in conflict: M.D.'s and Ph.D.'s. *The New York Times*.
- Antes, A. L., Brown, R. P., Murphy, S. T., Waples, E. P., Mumford, M. D., Connelly, S., & Devenport, L. D. (2007). Personality and ethical decision-making in research: The role of perceptions of self and others. *Journal of Empirical Research on Human Research Ethics*, 2(4), 15–34.
- Antes, A. L., Murphy, S. T., Waples, E. P., Mumford, M. D., Brown, R. P., Connelly, S., & Devenport, L. D. (2009). A meta-analysis of ethics instruction effectiveness in the sciences. *Ethics & Behavior*, 19(5), 379–402.
- Antes, A. L., Wang, X., Mumford, M. D., Brown, R. P., Connelly, S., & Devenport, L. D. (2010). Evaluating the effects that existing instruction on responsible conduct of research has on ethical decision making. *Academic Medicine*, 85(3), 519–526.
- Austin, A. E. (2002). Preparing the next generation of faculty: Graduate school as socialization to the academic career. *Journal of Higher Education*, 73(1), 94–122.
- Basu, P. (2006). Where are they now? *Nature Medicine*, 12(5), 492–493.
- Bazdaric, K., Bilic-Zulle, L., Brumini, G., & Petroveckii, M. (2011). Prevalence of plagiarism in recent submissions to the croatian medical journal. *Science and Engineering Ethics*, 18(2), 223–239.
- Bebeau, M. J., & Davis, E. L. (1996). Survey of ethical issues in dental research. *Journal of Dental Research*, 75(2), 845–855.
- Becker, G. S. (1968). Crime and punishment: Economic approach. *Journal of Political Economy*, 76(2), 169–217.
- Blader, S. L., & Tyler, T. R. (2003). A four-component model of procedural justice: Defining the meaning of a "fair" process. *Personality and Social Psychology Bulletin*, 29(6), 747–758.
- Blumenthal, D., Campbell, E. G., Gokhale, M., Yucel, R., Clarridge, B., Hilgartner, S., & Holtzman, N. A. (2006). Data withholding in genetics and the other life sciences: Prevalences and predictors. *Academic Medicine*, 81(2), 137–145.
- Bird, S. J. (2001). Mentors, advisors and supervisors: Their role in teaching responsible research conduct. *Science and Engineering Ethics*, 7(4), 455.
- Braunschweiler, P., & Goodman, K. W. (2007). The CITI program: An international online resource for education in human subjects protection and the responsible conduct of research. *Academic Medicine*, 82, 861–864.
- Braxton, J. M. (1990). Deviancy from the norms of science: A test of control theory. *Research in Higher Education*, 31(5), 461–476.
- Braxton, J. M. (1993). Deviancy from the norms of science: The effects of anomie and alienation in the academic profession. *Research in Higher Education*, 34(2), 213–228.
- Braxton, J. M., & Bayer, A. E. (1996). Personal experiences of research misconduct and the response of individual academic scientists. *Science, Technology and Human Values*, 21(2), 198–213.
- Broad, W. J., & Wade, N. (1982). *Betrayers of the truth: Fraud and deceit in the halls of science*. New York: Simon and Schuster.

- Brock, M. E., Vert, A., Kligyte, V., Waples, E. P., Sevier, S. T., & Mumford, M. D. (2008). Mental models: An alternative evaluation of a sensemaking approach to ethics instruction. *Science and Engineering Ethics*, 14(3), 449–472.
- Budd, J. M., Sievert, M. E., & Schultz, T. R. (1998). Phenomena of retraction: Reasons for retraction and citations to the publications. *Journal of the American Medical Association*, 280(3), 296–297.
- Bulger, R. E., & Heitman, E. (2007). Expanding responsible conduct of research instruction across the university. *Academic Medicine*, 82(9), 876–878.
- Bullock, M., & Panicker, S. (2003). Ethics for all: Differences across scientific society codes. *Science and Engineering Ethics*, 9(2), 159–170.
- Butler, D. (2010). Journals step up plagiarism policing. *Nature*, 466(7303), 167. doi:10.1038/466167a.
- Card, J. (2009, February 24). South Korea's Clone Wars. Foreign Policy. Retrieved July 6, 2012, from www.foreignpolicy.com/articles/2009/02/23/south_koreas_clone_wars
- Carey, B. (2011, November 3). Fraud case seen as a red flag for psychology research. *The New York Times*.
- Chan, A., Hróbjartsson, A., Haahr, M. T., Gøtzsche, P. C., & Altman, D. G. (2004). Empirical evidence for selective reporting of outcomes in randomized trials: Comparison of protocols to published articles. *Journal of the American Medical Association*, 291(20), 2457–2465.
- Charlier, P., Bridoux, V., Watier, L., Menetrier, M., Lorin de la Grandmaison, G., & Herve, C. (2011). Ethics requirements and impact factor. *Journal of Medical Ethics*, 38(4), 253–255.
- Choe, S. (2002, October 27). Discredited cloning expert is convicted of fraud in South Korea. *New York Times*, p. A-12.
- Chubin, D. E., & Hackett, E. J. (1990). *Peerless science: Peer Review and U.S. science policy*. Albany, NY: State University of New York Press.
- Claxton, L. D. (2005). Scientific authorship. Part 1. A window into scientific fraud? *Journal of Mutation Research*, 589(1), 17–30.
- Cokol, M., Iossifov, I., Rodriguez-Esteban, R., & Rzhetsky, A. (2007). How many scientific papers should be retracted? *EMBO Reports*, 8(5), 422–423. doi:10.1038/sj.embor.7400970.
- Committee on the Conduct of Science. (1989). *On being a scientist*. Washington, DC: National Academy of Sciences.
- Council of Graduate Schools. (2003). Project on scholarly integrity and the responsible conduct of research. *Council of Graduate Schools*. Retrieved July 12, 2012 from www.cgsnet.org/scholarly-integrity-and-responsible-conduct-research-rcr
- Corbyn, Z. (2009, August 20). Retractions up tenfold. *Times Higher Education*. Retrieved July 11, 2012, from www.timeshighereducation.co.uk/story.asp?storycode=407838
- Dalton, R. (2005). Obesity expert owns up to million-dollar crime. *Nature*, 434, 424–424.
- Davis, M. (2007). Eighteen rules for writing a code of professional ethics. *Science and Engineering Ethics*, 13(2), 171–189.
- Davis, M. (2008). Thinking through the issues in a code of ethics. *New Directions for Higher Education*, 142, 55–73.
- Davis-Blake, A., & Pfeffer, J. (1989). Just a mirage: The search for dispositional effects in organizational research. *Academy of Management Review*, 14(3), 385–400.
- De Vries, R., Anderson, M. S., & Martinson, B. C. (2006). Normal misbehavior: Scientists talk about the ethics of research. *Journal of Empirical Research on Human Research Ethics*, 1(1), 43–50.
- Dickersin, K. (1997). How important is publication bias? A synthesis of available data. *AIDS Education and Prevention*, 9(1 Suppl.), 15–21.
- Dominus, S. (2011, April 20). The crash and burn of an Autism guru. *The New York Times*.
- DuBois, J. M., Schilling, D. A., Heitman, E., Steneck, N. H., & Kon, A. A. (2010). Instruction in the responsible conduct of research: An inventory of programs and materials within CTSAs. *Clinical and Translational Science*, 3(3), 109–111.
- Dutch social psychologist found to have faked data. (2011). Retrieved July 9, 2012, from www.telegraph.co.uk/news/worldnews/europe/netherlands/8868337/Dutch-social-psychologist-found-to-have-faked-data.html

- Dwan, K., Altman, D. G., Arnaiz, J. A., Bloom, J., Chan, A. W., Cronin, E., & Williamson, P. R. (2008). Systematic review of the empirical evidence of study publication bias and outcome reporting bias. *PLoS One*, 3(8).
- Eastwood, S., Derish, P., Leash, E., & Ordway, S. (1996). Ethical issues in biomedical research: perceptions and practices of postdoctoral research fellows responding to a survey. *Science and Engineering Ethics*, 2(1), 89–114.
- Enders, W., & Hoover, G. A. (2004). Whose line is it?: Plagiarism in economics. *Journal of Economic Literature*, 42(2), 487–493.
- Enserink, M. (2011, November 10). Update: Disgraced Dutch Psychologist returns doctoral degree. Retrieved July 9, 2012 from news.sciencemag.org/scienceinsider/2011/11/update-disgraced-dutch-psychologist.html
- Executive Office of the President. (2000). Federal policy on research misconduct. *White House Office of Science and Technology Policy*. Retrieved July 8, 2012, from ori.hhs.gov/federal-research-misconduct-policy
- Fadan, R. R., Klag, M. J., Kass, N. E., & Krag, S. S. (2002). On the importance of research ethics and mentoring. *The American Journal of Bioethics*, 2(4), 50–51.
- Fanelli, D. (2009). How many scientists fabricate and falsify research? A systematic review and meta-analysis of survey data. *PLoS One*, 4(5), e5738. doi:[10.1371/journal.pone.0005738](https://doi.org/10.1371/journal.pone.0005738).
- Fanelli, D. (2010). Do pressures to publish increase scientists' bias? An empirical support from US States data. *PLoS One*, 5(4), e10271. doi:[10.1371/journal.pone.0010271](https://doi.org/10.1371/journal.pone.0010271).
- Fang, F. C., & Casadevall, A. (2011). Retracted science and the retraction index. *Infection and Immunity*, 79(10), 3855–3859.
- Federal Register. (2000). Notices, 65(93), 30600–30601.
- Feudtner, C., & Christakis, D. A. (1994). Making the rounds. The ethical development of medical students in the context of clinical rotations. *Hastings Center Report*, 24(1), 6–12.
- Fisher, C. B., Fried, A. L., & Feldman, L. G. (2009). Graduate socialization in the responsible conduct of research: A national survey on the research ethics training experiences of psychology doctoral students. *Ethics & Behavior*, 19(6), 496–518.
- Frankel, M. S. (1989). Professional codes: Why, how, and with what impact. *Journal of Business Ethics*, 8(2–3), 109–115.
- Fox, M. F. (1999). Scientific misconduct and editorial and peer review processes. In J. Braxton (Ed.), *Perspectives on scholarly misconduct in the sciences* (pp. 162–173). Columbus, OH: Ohio State University Press.
- Fox, M. F., & Braxton, J. (1999). Self-regulation and social control of scientific misconduct: Roles, patterns, and constraints. In J. Braxton (Ed.), *Perspectives on scholarly misconduct in the sciences* (pp. 315–330). Columbus, OH: Ohio State University Press.
- Freeman, R., Weinstein, E., Marincola, E., Rosenbaum, J., & Solomon, F. (2001). Competition and careers in biosciences. *Science*, 294(5550), 2293–2294. doi:[10.1126/science.1067477](https://doi.org/10.1126/science.1067477).
- Funk, C. L., Barrett, K. A., & Macrina, F. L. (2007). *Accountability in Research*, 14, 269–305.
- Gallant, T. B. (2011). *Creating the ethical academy: A systems approach to understanding misconduct and empowering change in higher education*. New York: Routledge.
- Gardner, W., Lidz, C. W., & Hartwig, K. C. (2005). Authors' reports about research integrity problems in clinical trials. *Contemporary Clinical Trials*, 26(2), 244–251. doi:[10.1016/j.cct.2004.11.013](https://doi.org/10.1016/j.cct.2004.11.013).
- Garner, H. R. (2011). Combating unethical publications with plagiarism detection services. *Urologic Oncology-Seminars and Original Investigations*, 29(1), 95–99. doi:[DOI 10.1016/j.urolonc.2010.09.016](https://doi.org/DOI%2010.1016/j.urolonc.2010.09.016).
- Geggie, D. (2001). A survey of newly appointed consultants' attitudes towards research fraud. *Journal of Medical Ethics*, 27(5), 344–346.
- Giles, J. (2004). Media attack prompts editorial backlash against MMR study. *Nature*, 427(6977), 765. doi:[10.1038/427765a](https://doi.org/10.1038/427765a).
- Gino, F., Ayal, S., & Ariely, D. (2009). Contagion and differentiation in unethical behavior: The effect of one bad apple on the barrel. *Psychological Science*, 20(3), 393–398. doi:[10.1111/j.1467-9280.2009.02306.x](https://doi.org/10.1111/j.1467-9280.2009.02306.x).

- Glick, L. J., & Shamoo, A. E. (1994). Results of a survey on research practices, completed by attendees at the third conference on research policies and quality assurance. *Accountability in Research*, 3(4), 275–280.
- Goodstein, D. (2002). Scientific misconduct. *Academe*, 88(1), 28–31.
- Greenberg, M., & Goldberg, L. (1994). Ethical challenges to risk scientists: An exploratory analysis of survey data. *Science Technology Human Values*, 19(2), 223–241.
- Grinnell, F. (2012). Research integrity and everyday practice of science. *Science and Engineering Ethics*. doi:10.1007/s11948-012-9376-5.
- Gunsalus, C. K. (1998). Presenting the need for whistleblowing: Practical advice for university administrators. *Science and Engineering Ethics*, 4, 75–94.
- Hafstad, A. (2006a, January 23). Doctor admits to cheating on more research. *Aftenposten*. Retrieved 27 March 2008, from www.aftenposten.no/english/local/article1204063.ece
- Hafstad, A. (2006b, June 30). Cheating has international impact. *Aftenposten*. Retrieved 27 March 2008, from www.aftenposten.no/english/local/article1373320.ece
- Hagstrom, W. O. (1965). *The scientific community*. New York: Basic Books.
- Heinrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., & McElreath, R. (2001). In search of homo economicus: Behavioral experiments in 15 small-scale societies. *American Economic Review*, 91(2), 73–78.
- Heitman, E., Olsen, C. H., Anestidou, L., & Bulger, R. E. (2007). New graduate students' baseline knowledge of the responsible conduct of research. *Academic Medicine*, 82(9), 838–845.
- Henry, D. A., Kerridge, I. H., Hill, S. R., McNeill, P. M., Doran, E., Newby, D. A., & Day, R. O. (2005). Medical specialists and pharmaceutical industry-sponsored research: A survey of the Australian experience. *Medical Journal of Australia*, 182(11), 557–560.
- Hunt, M. (1989, May 14). Did the penalty fit the crime? *The New York Times*.
- Institute of Medicine. (2002). *Integrity in scientific research: Creating an environment that promotes responsible conduct*. Washington, DC: The National Academies Press.
- Iverson, M., Frankel, M. S., & Siang, S. (2003). Scientific societies and research integrity: What are they doing and how well are they doing it? *Science and Engineering Ethics*, 9(2), 141–158.
- Jacobsen, G., & Hals, A. (1995). Medical investigators' views about ethics and fraud in medical research. *Journal of the Royal College of Physicians of London*, 29(5), 405–409.
- Jayaraman, K. (2008). Chemistry's 'colossal' fraud. *Chemistry World*, 5(4), 10–10. Retrieved July 9, 2012, from www.rsc.org/chemistryworld/News/2008/March/25030801.asp
- Johnson, D. (1999). From denial to action: Academic and scientific societies grapple with misconduct. In J. Braxton (Ed.), *Perspectives on scholarly misconduct in the sciences* (pp. 42–74). Columbus, OH: Ohio State University Press.
- Kakuk, P. (2009). The legacy of the Hwang case: Research misconduct in biosciences. *Science and Engineering Ethics*, 15, 545–562.
- Kalichman, M. (2005). Use and abuse of the internet for teaching research ethics. *Science and Engineering Ethics*, 11(3), 341–345.
- Kalichman, M. W. (2007). Responding to challenges in educating for the responsible conduct of research. *Academic Medicine*, 82(9), 870–875.
- Kalichman, M. W., & Friedman, P. J. (1992). A pilot study of biomedical trainees' perceptions concerning research ethics. *Academic Medicine*, 67(11), 769–775.
- Keiger, D., & De Pasquale, S. (2002). Trials & tribulation. *The Johns Hopkins Magazine*, 54(1), 28–41. Retrieved December 9, 2012, from <http://www.jhu.edu/jhumag/0202web/trials.html>
- Keith-Spiegel, P., Sieber, J., & Koocher, G. P. (2010). *Responding to research wrongdoing: A user-friendly guide*. Retrieved July 9, 2012, from http://www.ori.hhs.gov/documents/Responding_to_Research_Wrongdoing.pdf
- Kerr, N. L. (1998). HARKing: Hypothesizing after the results are known. *Personality and Social Psychology Review*, 2(3), 196–217. doi:10.1207/s15327957pspr0203_4.
- Kidder, D. L. (2005). Is it “who I am,” “what I can get away with,” or “what you’ve done to me”? A multi-theory examination of employee misconduct. *Journal of Business Ethics*, 57(4), 389–398. doi:10.1007/s10551-004-6713-x.

- Kintisch, E. (2006, June 28). Poehlman sentenced to 1 year of prison. *Science NOW*. Retrieved July 6, 2012, from news.sciencemag.org/sciencenow/2006/06/28-01.html.
- Koocher, G., & Keith-Spiegel, P. (2010). Peers nip misconduct in the bud. *Nature*, 466, 438–440.
- Koocher, G. P., Keith-Spiegel, P., Tabachnick, B. G., Sieber, J. E., & Butler, D. L. (2010). How do researchers respond to perceived scientific wrongdoing?: Overview, method and survey results. Supplementary materials to: Koocher, G., & Keith-Spiegel, P. (2010). Peers nip misconduct in the bud. *Nature*, 466, 438–440. Retrieved December 10, 2012, from http://www.ethicsresearch.com/images/Method_Results_July_22_2010_a.pdf.
- Koshland, D. (1987). Fraud in science. *Science*, 235, 141.
- Kraut, A. (2011). Despite occasional scandals, science can police itself. *The Chronicle of Higher Education*, 58(16), A72–A72.
- Kreutzberg, G. W. (2004). The rules of good science: Preventing scientific misconduct is the responsibility of all scientists. *EMBO Reports*, 5(4), 330–332. doi:DOI 10.1038/sj.embor.7400136.
- LaFollette, M. C. (1994). The politics of research misconduct: Congressional oversight, universities, and science. *Journal of Higher Education*, 65(3), 261–285.
- Lee, R. M. (1993). *Doing research on sensitive topics*. Newbury Park, CA: Sage Publications.
- Lemonick, M. D. (2006). The rise and fall of the cloning king. *Time*, 167(2), 40–43.
- Lewicki, R. J. (1983). Negotiating in organizations. In M. H. Bazerman & R. J. Lewicki (Eds.), *Negotiating in organizations* (pp. 68–90). Beverly Hills, CA: Sage Publications.
- List, J. A., Bailey, C. D., Euzent, P. J., & Martin, T. L. (2001). Academic economists behaving badly?: A survey on three areas of unethical behavior. *Economic Inquiry*, 39(1), 162–170.
- Loui, M. (2002). Seven ways to plagiarize: Handling real allegations of research misconduct. *Science and Engineering Ethics*, 8(4), 529–539.
- Louis, K. S., Anderson, M. S., & Rosenberg, L. (1995). Academic misconduct and values: The departments influence. *The Review of Higher Education*, 18(4), 393–422.
- Macrina, F. L. (1995). *Scientific integrity: An introductory text with cases*. Washington, DC: American Society for Microbiology Press.
- Macrina, F. L. (2007). Scientific societies and promotion of the responsible conduct of research: Codes, policies, and education. *Academic Medicine*, 82(9), 865–869.
- Marris, E. (2006). Doctor admits *Lancet* study is fiction. *Nature*, 439, 248–249. doi:10.1038/439248b.
- Marshall, E. (2006). Panel: Extensive sudbø fraud. *Science*, 313(5783), 29–29.
- Martinson, B. C., Anderson, M. S., & de Vries, R. (2005). Scientists behaving badly. *Nature*, 435(7043), 737–738. doi:10.1038/435737a.
- Martinson, B. C., Anderson, M. S., Crain, A. L., & De Vries, R. (2006). Scientists' perceptions of organizational justice and self-reported misbehaviors. *Journal of Empirical Research on Human Research Ethics*, 1(1), 51–66. doi:10.1525/jer.2006.1.1.51.
- Mastroianni A., & Kahn J. (1999). Encouraging accountability in research: A pilot assessment of training efforts. *Accountability in Research*, 7(1), 85–100.
- Mcgee, R., Almquist, J., Keller, J. L., & Jacobsen, S. J. (2008). Teaching and learning responsible research conduct: Influences of prior experiences on acceptance of new ideas. *Accountability in Research*, 15(1), 30.
- Merton, R. K. (1942). A note on science and democracy. *Journal of Legal and Political Sociology*, 1(1–2), 115–126.
- Merton, R. K. (1973). *The sociology of science: Theoretical and empirical investigations*. Chicago: University of Chicago Press.
- Meyer, M. J., & McMahon, D. (2004). An examination of ethical research conduct by experienced and novice accounting academics. *Issues in Accounting Education*, 19, 413–442.
- Michalek, A. M., Hutson, A. D., Wicher, C. P., & Trump, D. L. (2010). The costs and underappreciated consequences of research misconduct: A case study. *PLoS Medicine*, 7(8), e1000318. doi:10.1371/journal.pmed.1000318.
- Minkel, J. (2003). Scandal rocks a prestigious lab. *Popular Science*, 262(1), 70.
- Molander, E. A. (1987). A paradigm for design, promulgation and enforcement of ethical codes. *Journal of Business Ethics*, 6(8), 619–631.
- Montoya, I. D., & Richard, A. J. (1994). A comparative-study of codes of ethics in health-care facilities and energy companies. *Journal of Business Ethics*, 13(9), 713–717.

- Moore, G. (2006). Managing ethics in higher education: Implementing a code or embedding virtue? *Business Ethics: A European Review*, 15(4), 407–418.
- Mumford, M. D., Connelly, S., Murphy, S. T., Devenport, L. D., Antes, A. L., Brown, R. P., & Waples, E. P. (2009). Field and experience influences on ethical decision making in the sciences. *Ethics & Behavior*, 19(4), 263–289. doi:Doi 10.1080/10508420903035257.
- Mumford, M. D., Devenport, L. D., Brown, R. P., Connelly, S., Murphy, S. T., Hill, J. H., & Antes, A. L. (2006). Validation of ethical decision making measures: Evidence for a new set of measures. *Ethics & Behavior*, 16(4), 319–345. doi:10.1207/s15327019eb1604_4.
- Mumford, M. D., Waples, E. P., Antes, A. L., Murphy, S. T., Connelly, S., Brown, R. P., & Devenport, L. D. (2009). Exposure to unethical career events: Effects on decision making, climate, and socialization. *Ethics & Behavior*, 19(5), 351–378. doi:Doi 10.1080/10508420903035356.
- Murphy, K. R. (1993). *Honesty in the workplace*. Pacific Grove, CA: Brooks/Cole Pub. Co.
- National Institutes of Health. (1986). Special issue: Policies and procedures for dealing with possible misconduct in science. *NIH Guide for Grants and Contracts*, 15(11), 1–37.
- National Institutes of Health. (2000). *Required education in the protection of human research participants*. Retrieved July 6, 2012, from grants.nih.gov/grants/guide/notice-files/not-od-00-039.html
- National Institutes of Health. (2011). *Funding Opportunities & Notices Search*. Retrieved July 9, 2012, from http://grants.nih.gov/grants/guide/search_results.htm?text_curr=findings+of+research+misconduct&Search.x=0&Search.y=0&scope=not&year=active&sort=&text_prev=
- National Science Foundation. (1987). Misconduct in science and engineering research: Final regulations. 45 CFR 689.52 *Federal Register*, 24466–24470.
- National Science Foundation, Office of Inspector General. (2011). *Semiannual Report to Congress*. Retrieved July 9, 2012, from www.nsf.gov/oig/pubs.jsp
- Neale, A. V., Northrup, J., Dailey, R., Marks, E., & Abrams, J. (2007). Correction and use of biomedical literature affected by scientific misconduct. *Science and Engineering Ethics*, 13(1), 5–24.
- Nijhof, A., Cludts, S., Fisscher, O., & Laan, A. (2003). Measuring the implementation of codes of conduct: An assessment method based on a process approach of the responsible organisation. *Journal of Business Ethics*, 45(1–2), 65–78.
- Normile, D., Vogel, G., & Holden, C. (2005). Cloning researcher says work is flawed but claims results stand. *Science*, 310, 1886–1887. doi:10.1126/science.310.5756.1886.
- Office of Research Integrity. (2004). Introduction to the responsible conduct of research. *Office of Research Integrity*. Retrieved July 12, 2011, from ori.hhs.gov/ori-intro
- Park, R. L. (2008). Fraud in science. *Social Research*, 75(4), 1135–1150.
- Panel on Scientific Responsibility and the Conduct of Research. (1992). *Responsible science: Ensuring the integrity of the research process*. Washington, DC: National Academy Press.
- Pitt, H. L., & Groskaufmanis, K. A. (1990). Minimizing corporate civil and criminal liability: A second look at corporate codes of conduct. *The Georgetown Law Journal*, 78, 1559–1654.
- Plemmons, D. K., Brody, S. A., & Kalichman, M. W. (2006). Student perceptions of the effectiveness of education in the responsible conduct of research. *Science and Engineering Ethics*, 12(3), 571–582.
- Ranstam, J., Buyse, M., George, S. L., Evans, S., Geller, N. L., Scherrer, B., et al. (2000). Fraud in medical research: An international survey of biostatisticians. *Control Clinical Trials*, 21(5), 415–427.
- Redman, B. K., & Merz, J. F. (2008). Sociology. scientific misconduct: Do the punishments fit the crime? *Science*, 321, 775. doi:10.1126/science.1158052.
- Rennie, S. C., & Crosby, J. R. (2002). Students' perceptions of whistle blowing: Implications for self-regulation. *Medical Education*, 36(2), 173–179.
- Resnik, D. B. (2007). *The price of truth: How money affects the norms of science*. New York: Oxford University Press.
- Reynolds, S. M. (2003). Review of ORI findings of scientific misconduct, May 1992–October 2002. *Control Clinical Trials*, 24, 190s–191s.
- Rhoades, L. J. (2004). *ORI closed investigations into misconduct allegations involving research supported by the Public Health Service: 1994–2003*. Washington, DC: Department of Health and Human Services, Office of Research Integrity.

- Riis, P. (2001). The concept of scientific dishonesty: Ethics, value systems, and research. In S. Lock, F. Wells, & M. Farthing (Eds.), *Fraud and misconduct in biomedical research* (3rd ed., pp. 3–12). London: BMJ Books.
- Rilling, J., Gutman, D., Zeh, T., Pagnoni, G., Berns, G., & Kilts, C. (2002). A neural basis for social cooperation. *Neuron*, 35(2), 395–405.
- Rossner, M., & Yamada, K. M. (2004). What's in a picture? The temptation of image manipulation. *The Journal of Cell Biology*, 166(1), 11–15.
- Ryan, K. J. (1996). Integrity and misconduct in research: Report of the commission on research integrity. *Commission on Research Integrity*. Retrieved July 12, 2012, from ori.dhhs.gov/documents/report_commission.pdf
- Sargent, J. F., Jr. (2011). *Federal research and development funding: FY2011* (p. 4). Washington, DC: Congressional Research Service.
- Scheetz, M., & Steneck, N. H. (2001). *Research integrity research program*. Unpublished report.
- Schrag, B. (2005). Teaching research ethics: Can web-based instruction satisfy appropriate pedagogical objectives? *Science and Engineering Ethics*, 11(3), 347–366.
- Schulz, W. G. (2008). A massive case of fraud. *Chemical & Engineering News*, 86(7), 37–38. Retrieved July 6, 2012, from pubs.acs.org/cen/science/86/8607sci1.html
- Schwartz, M. S. (2004). Effective corporate codes of ethics: Perceptions of code users. *Journal of Business Ethics*, 55(4), 321–341.
- Seppa, N. (2006). Mouth cancer data faked, journal says. *Science News*, 169(6), 94–94.
- Service, R. F. (2003). More of Bell Labs physicist's papers retracted. *Science*, 299(5603), 31.
- Shaw, M. A., Chapman, D. W., & Rumyantseva, N. (2011). The impact of the Bologna Process on academic staff in Ukraine. *Higher Education Management and Policy*, 23(3), 71–91.
- Singapore Statement on Research Integrity. (2010). Retrieved July 8, 2012, from www.singaporestatement.org
- Skarlicki, D. P., & Folger, R. (1997). Retaliation in the workplace: The roles of distributive, procedural, and interactional justice. *Journal of Applied Psychology*, 82(3), 434–443.
- Smaglik, P. (2002). Learning from misconduct. *Nature*, 420(6911), 3.
- Song, F., Parekh-Bhurke, S., Hooper, L., Loke, Y. K., Ryder, J. J., Sutton, A. J., et al. (2009). Extent of publication bias in different categories of research cohorts: A meta-analysis of empirical studies. *BMC Medical Research Methodology*, 9(79), doi: Artn 79 Doi 10.1186/1471-2288-9-79.
- Steen, G. R. (2010). Retractions in the scientific literature: Do authors deliberately commit research fraud? *Journal of Medical Ethics*, 10, 1–5.
- Steneck, N. H. (1994). Research universities and scientific misconduct: History, policies, and the future. *Journal of Higher Education*, 65(3), 310–330.
- Steneck, N. H. (1999). Confronting misconduct in science in the 1980s and 1990s: What has and has not been accomplished? *Science and Engineering Ethics*, 5(2), 161–176.
- Steneck, N. H. (2002). Assessing the integrity of publicly supported research. In N. H. Steneck & M. D. Scheetz (Eds.), *Investigating research integrity: Proceedings of the First ORI research conference on research integrity* (pp. 1–16). Washington, DC: Office of Research Integrity.
- Steneck, N. H. (2006). Fostering integrity in research: Definitions, current knowledge, and future directions. *Science and Engineering Ethics*, 12(1), 53–74.
- Steneck, N. H. (2008). Fostering professionalism and integrity in research. *University of St. Thomas Law Journal*, 5(2), 522–543.
- Steneck, N. H. (2010). Research integrity in the context of global cooperation. In M. S. Anderson & N. H. Steneck (Eds.), *International research collaborations: Much to be gained, many ways to get in trouble* (pp. 9–20). New York: Routledge.
- Steneck, N. H., & Bulger, R. E. (2007). The history, purpose, and future of instruction in the responsible conduct of research. *Academic Medicine*, 82(9), 829–834.
- Stern, S. (1999). *Do scientists pay to be scientists?* (National Bureau of Economic Research Working Papers). Cambridge, MA: National Bureau of Economic Research.
- Swazey, J. P., Anderson, M. S., & Louis, K. S. (1993). Ethical problems in academic research. *American Scientist*, 81, 542–553.
- Titus, S. L., Wells, J. A., & Rhoades, L. J. (2008). Repairing research integrity. *Nature*, 453, 980–982.

- True, G., Alexander, L. B., & Richman, K. A. (2011). Misbehaviors of front-line research personnel and the integrity of community-based research. *Journal of Empirical Research on Human Research Ethics*, 6(2), 3–12. doi:[10.1525/jer.2011.6.2.3](https://doi.org/10.1525/jer.2011.6.2.3).
- Tyler, T. R., & Blader, S. L. (2003). The group engagement model: Procedural justice, social identity, and cooperative behavior. *Personality and Social Psychology Review*, 7(4), 349–361.
- United States Congress, 99th Congress. (1985). Health Research Extension Act of 1985, PL 99–158.
- U.S. Department of Health and Human Services. (2005). *Public health service policies on research misconduct*. Retrieved July 8, 2012, from ori.hhs.gov/sites/default/files/42_cfr_parts_50_and_93_2005.pdf
- U.S. Department of Health and Human Services. (2010). *Office of Research Integrity 2010 annual report*. Retrieved July 6, 2012, from ori.hhs.gov/images/ddblock/ori_annual_report_2010.pdf
- U.S. Department of Justice. (2005, March 17). Press Release – Dr. Eric T. Poehlman. *Office of Research Integrity*. Retrieved July 6, 2012, from ori.hhs.gov/press-release-poehlman
- Vogel, G. (2011). Psychologist accused of fraud on ““astonishing scale””. *Science*, 334, 579.
- Wager, E., & Williams, P. (2011). Why and how do journals retract articles? An analysis of Medline retractions 1988–2008. *Journal of Medical Ethics*, 37(9), 567–570. doi:[10.1136/jme.2010.040964](https://doi.org/10.1136/jme.2010.040964).
- Wallis, C., Wymelenberg, S., & Schapiro, R. (1983). Fraud in a Harvard lab. *Time*, 121(9), 49.
- Wenger, N. S., Korenman, S. G., Berk, R., & Berry, S. (1997). The ethics of scientific research: An analysis of focus groups of scientists and institutional representatives. *Journal of Investigative Medicine*, 45(6), 371–380.
- Wise, J. (2011). Extent of Dutch psychologist’s research fraud was “unprecedented”. *British Medical Journal*, 343. doi:[d720110.1136/bmj.d7201](https://doi.org/10.1136/bmj.d7201).
- Wright, D. E. (2008). Mentoring and research misconduct: An analysis of research mentoring in closed ORI cases. *Science and Engineering Ethics*, 14(3), 323–336.
- Zuckerman, H. A. (1977). Deviant behavior and social control in science. In E. Sagarin (Ed.), *Deviance and social change* (pp. 88–138). Beverly Hills, CA: Sage Publications.
- Zuckerman, H. A. (1988). The sociology of science. In N. Smelser (Ed.), *Handbook of sociology* (pp. 511–574). Thousand Oaks, CA: Sage Publications.

Chapter 6

Instrumental Variables: Conceptual Issues and an Application Considering High School Course Taking

Rob M. Bielby, Emily House, Allyson Flaster, and Stephen L. DesJardins

Introduction

In response to falling high school graduation rates and concerns about college readiness and workforce development over the past decade, 20 states have increased high school graduation requirements. While these requirements vary across states, most mandate that students complete 4 years of math and English coursework in order to graduate (Achieve, 2011).

Michigan is one example of a state implementing curricular changes in favor of more demanding coursework for high school students. In 2006, legislators implemented a statewide college preparatory high school curriculum—the Michigan Merit Curriculum (MMC), one of the most comprehensive sets of high school graduation requirements in the nation. The new courses required in order to graduate are intensive and specific: Algebra II, Geometry, Biology, and Chemistry or Physics and at least 2 years of a foreign language (Michigan Department of Education, 2006).

The curriculum's focus on math and science is based on historically low enrollments in the state in advanced courses in these areas. Prior to the implementation of the MMC, only one-third of Michigan's school districts required students to take 4 years of math. As such, only 1 out of 8 students took Algebra II, instead favoring less intensive math courses, or no math courses at all (Michigan Department of Education, 2006).

There is an ample body of research that supports states' decisions to make these curricular changes and to support an emphasis on math coursework to meet goals related to college and workforce readiness. Research demonstrates that students

R.M. Bielby • E. House • A. Flaster • S.L. DesJardins, Ph.D. (✉)
Center for the Study of Higher and Postsecondary Education, School of Education,
University of Michigan, 610 E. University Drive, Ann Arbor, MI 48109-1259, USA
e-mail: rbielby@umich.edu; ehous@umich.edu; aflaster@umich.edu; sdesj@umich.edu

who take and succeed in intensive math courses have an increased likelihood of attending college and have improved long-term labor market outcomes (Adelman, 1999; Goodman, 2008; Levine & Zimmerman, 1995; Rose & Betts, 2004; Sadler & Tai, 2007; Sells, 1973; Simpkins, Davis-Kean, & Eccles, 2006).

One of the most powerful levers driving these changes to high school curricula in Michigan and throughout the nation is *Answers in the Toolbox* and *The Toolbox Revisited*, publications of the United States Department of Education that assert that students who take more intensive math courses, particularly those who take Algebra II or higher, are more likely than their peers who take less intensive math courses to attend a college or university and to attain a degree. The discussion surrounding these publications served as an inspiration for a number of states to begin adopting more intensive graduation requirements, particularly related to math preparation (Adelman, 2006).

It is important to note that the majority of the literature on which the curricular reforms in Michigan and around the nation were based is correlational in nature. The relationship between intensive math courses (e.g., Algebra II) and postsecondary access and completion maybe influenced by many other factors that are not accounted for in the studies touting the merits of students completing challenging math courses. We will provide an example of the influence of other factors in the case of Grace and Adam below.

Consider Grace and Adam, two high school students in Michigan. Prior to the implementation of the MMC, Grace chose to take Algebra II, whereas Adam did not. Grace, a straight A student, was recommended for the course by her guidance counselor, whereas Adam's teachers suggested that he may be better suited for a lower-level math course. Grace and Adam have different abilities and motivations, and, as such, the highest level math course they choose to take differs.

The methodological issue in the case of Grace and Adam, as well as with some of the studies mentioned above, is one of self-selection. Students like Grace, who chose to take a more intensive math course, are quite likely different than students like Adam, who chose to take a less demanding course. Students like Grace may possess greater academic abilities or may be more motivated to take challenging courses than their peers like Adam. As such, studies that do not account for these differences in student characteristics are making comparisons between groups of students that are not comparable. It is problematic, therefore, when the findings of studies that do not consider these differences in student characteristics are used to drive education policymaking.

The highest level of math that students like Grace and Adam choose to take (Algebra II for the former, something less intensive, like Consumer Math, for the latter) may be related to whether or not they complete college following their graduation from high school. Or, stated differently, the factors that drive them to take a challenging or less challenging math course may also influence college outcomes. However, it is difficult to state, given the differences in Grace's and Adam's academic characteristics and motivation, that the highest math course they took *caused* them to complete college or not. To better determine if a causal relationship exists between a student's highest math course in high school and college completion, education researchers can employ a number of statistical methods to investigate the variation in an outcome (college completion) that is *caused* by a particular program

or policy—in this case, taking an intensive math course in high school. To be clear, we are interested in determining a causal effect (rather than a simple association) so that policies related to the outcome of interest are made appropriately and efficiently, such that resources are not wasted on a program or intervention that may not have the intended results.

To investigate the causal impacts of educational interventions and policies on student outcomes, many educational researchers have recently begun to employ experimental and quasi-experimental methodologies (Abdulkadiroglu, Angrist, Dynarski, Kane, & Pathak, 2011; Attewell & Domina, 2008; Bettinger & Baker, 2011; Dynarski, Hyman, & Schanzenbach, 2011). In the study presented in this chapter, we follow this lead by employing methods that can help us establish whether a causal relationship exists between taking Algebra II or higher in high school and college completion.

Experimental research is considered the “gold standard” of causal analysis (United States Department of Education, 2008). Performing a random experiment would, in theory, be the most effective way to determine the causal effect of taking Algebra II on academic outcomes (e.g., high school completion, postsecondary attendance and completion, life-course events). For example, students could be randomly assigned to take Algebra II or a less intense math course, and their post-secondary enrollment and completion patterns following graduation could be examined to determine the causal impact of Algebra II. Assuming that the randomization was done properly, the two groups would be, on average, identical on all observable and unobservable outcomes. If so, one could simply compare the rates of degree attainment between the treatment (Algebra II) and control (lower-level math) groups in order to determine the causal effect of high school course taking (McCall & Bielby, 2012).

Experimental research is, however, often difficult or impossible to do in educational settings because of logistical, cost, and ethical constraints. For example, often times educators cannot in good conscience randomly assign students to courses that will disadvantage some students. If an administrator suspects, for example, that enrolling a student in a small class with an outstanding teacher will dramatically improve his learning, how can this administrator support an experiment that will withhold this “treatment” from some students? Randomized trials can also be very costly to conduct or difficult to implement in educational settings. Given these difficulties, researchers have begun to rely on quasi-experimental methods, to be explored in greater depth below, to determine the impact of various education interventions, including those related to intensive math course taking in high school.

The objective of this chapter is to provide the reader with an introduction to the application of one such technique, instrumental variable (IV) estimation, designed to remedy the inferential problem discussed above. We provide the reader with a description of relevant literature and conceptual issues, the terminology used when discussing IV analyses, and how this method can be applied to educational issues. To inform the latter, throughout the chapter, we provide an example of the application of IV methods to study whether taking Algebra II in high school has a causal effect on college completion.

Conceptual Background

Education stakeholders have been concerned about student course taking at the secondary level and its potential impact on educational and labor market outcomes for decades. In *A Nation at Risk* (National Commission on Excellence in Education, 1983), the American high school was famously characterized as providing a “smorgasbord” of curricular options that were detrimental to the majority of students, as many oversampled the “desserts” (e.g., physical education courses) and left the “main course” (e.g., college prep courses) untouched. Since the 1980s, a widespread increase in the state- and district-mandated minimum number of core academic courses students must complete to graduate has increased the number of units they complete in math, science, English, and other nonvocational subjects (Planty, Provasnik, & Daniel, 2007). However, the intensity of the coursework that students complete within these domains varies considerably.¹

Researchers have documented disparities in the highest level of math coursework taken between racial/ethnic groups and social classes. Analysis of course taking trends in national data indicates that although Black and White students earn the same number of math credits in high school, White students are significantly more likely than Black students to have earned these credits in advanced courses such as Precalculus or Calculus (Dalton, Ingels, Downing, & Bozick, R, 2007). There are also disparities between students from low- and high-socioeconomic (SES) backgrounds in both the number and type of math credits earned. These statistics suggest that access to coursework is distributed through mechanisms that differentially impact students from various backgrounds.

Two mechanisms may determine student access to high school coursework: structural forces and individual choices (Lee, Chow-Hoy, Burkam, Geverdt, & Smerdon, 1998). Structural forces are factors outside the student’s control that serve to constrain his or her options. These include placement into curricular tracks by school personnel or the availability of coursework within their particular school. When schools have fewer structural constraints on course options, students are able to exercise greater individual choice by choosing their coursework from a menu of options that provide credits toward the high school diploma. The following sections discuss how structural and individual factors influence the coursework that high school students take.

¹ We use the term *course taking intensity* throughout the chapter to refer to the orientation of the courses students take. We use this term to be inclusive of the course taking literature, as researchers operationalize course taking in multiple ways. Examples include the highest level of coursework or number of Carnegie units taken in a particular subject (e.g., Rose & Betts, 2001); participating in curricular “tracks” (e.g., Fletcher & Zirkle, 2009); the number of college preparatory courses taken such as honors, AP, or IB (e.g., Geiser & Santelices, 2004); and indices of course taking that combine several of the aforementioned measures (e.g., Attewell & Domina, 2008).

Structural Forces

Student course taking patterns are strongly influenced by the options available to them. Schools may vary in their willingness and ability to offer a range of courses that are viewed as solid preparation for college. For instance, analysis of national transcript data indicates that Midwestern, small, rural, and predominately White high schools are the least likely to offer advanced placement (AP) coursework (Planty et al., 2007). The practice of “tracking” in K-12 education, or the grouping of students into curricular pathways based on their perceived academic ability, can also serve to constrain student course taking options (Gamoran, 1987). Research on how tracking decisions are made by high school staff indicates that placement decisions are largely a function of a student’s position in the distribution of standardized test scores, their perceived level of motivation, recommendations from middle school teachers, and the availability of school resources (Hallinan, 1994; Oakes & Guiton, 1995). Also, parent wishes may be accommodated when making track placements, although middle- and upper-class parents are likely to have an advantage in advocating for their preferences, as they more often possess the social capital needed to navigate bureaucratic educational environments (Useem, 1992).

Although formal tracking policies have been abolished in many schools, students may continue to experience barriers to unrestricted enrollment in coursework. This is often due to disparities in information about course options and uneven enforcement of course prerequisites across racial/ethnic, social class, and ability groups (Yonezawa, Wells, & Serna, 2002). Course prerequisites play a significant role in restricting access to math coursework because the courses are typically hierarchically arranged in a specific sequence (e.g., Algebra I is followed by Algebra II) beginning in middle school or even earlier (Schneider, Swanson, & Riegle-Crumb, 1998; Useem, 1992). Therefore, it should come as no surprise that middle school math achievement is one of the most significant predictors of taking advanced math courses in high school (Attewell & Domina, 2008).

Disparities in course placement practices and the availability of information about course options within schools may partially explain the finding that disadvantaged students who attend integrated schools take less intensive coursework than their peers who attend segregated schools (Crosnoe, 2009; Kelly, 2009). For instance, Crosnoe finds that low-income students who attend predominantly middle- or high-income schools take lower levels of coursework than low-income students who attend predominantly low-income schools. Similarly, Kelly finds that the greater the proportion of White students in a school, the lower the representation of Black students in the two highest math courses. These results demonstrate that in addition to the allocation of access to intensive courses *across* schools, the distribution of access *within* a school plays a key role in structuring student course taking patterns.

Individual Choices

Despite formal or de facto tracking, most students have the ability to choose some of their high school coursework. Schools are more likely to condone downward “track mobility” than upward, allowing students to choose lower-level coursework than originally assigned (Oakes & Guiton, 1995). Additionally, once minimum graduation requirements are met in each subject, students have the option to continue taking advanced coursework if they have demonstrated competency in previous courses. Researchers often examine the progress of students through the sequence of math courses (the mathematics “pipeline”) to determine the highest level of mathematics coursework students are able to take (Burkam & Lee, 2003; Lee et al., 1998). National data indicate that a large proportion of students—44%—choose to drop out of the pipeline at either Algebra I or Algebra II (Dalton et al., 2007).

Educational aspirations also play a key role in determining the coursework that students pursue. High school freshman and sophomores who report having college aspirations are more likely to take advanced math coursework during subsequent years than their peers with lower educational aspirations (Bozick & Ingels, 2008; Frank et al., 2008). Parent aspirations for their children are important as well. After controlling for confounding factors, parent educational expectations significantly predict whether students take advanced mathematics in the senior year of high school—a year when many students choose to stop taking advanced mathematics (Ma, 2001). Additionally, peers can influence course selection. Frank et al. find that females progress farther in the math pipeline when other females in their “local position” (a cluster of students who tend to take the same sets of courses) also advance in their math coursework. (Note: Peer effects on course taking may have implications for our empirical strategy. We will return to this point later in the chapter)

Factors that are beyond the control of students, parents, and educators may also influence the intensity of coursework that students choose to take. For instance, variations in labor market conditions may modify student postsecondary enrollment plans. Students could infer from a strong labor market that ample employment for the noncollege educated exists, which may tend to decrease their interest in courses that lead to college enrollment. The availability of plentiful and well-paying local jobs for young people may also encourage students to take less intensive courses that allow more time for working while in high school, thus ensuring higher immediate earnings. Economic research on the impact of increasing the minimum wage on high school enrollments indicates that a student’s education decision-making is indeed responsive to labor market conditions. For example, the commitment of lower-ability and lower-income students to completing a high school diploma declines in response to increases in the minimum wage (Ehrenberg & Marcus, 1982; Neumark & Wascher, 1995). Therefore, it is possible that college preparatory course taking and the strength of the local labor market are negatively related.

As the prior literature demonstrates, students’ course taking is conditional on many factors, including their educational aspirations, parental expectations, school

resources, and local labor market conditions. In the next section, we present frameworks that offer competing explanations for how student course taking is related to their subsequent educational outcomes. We also examine research on the relationship between high school course taking and educational attainment and consider how research has attempted to isolate the effect of courses from related factors (e.g., student characteristics, school context) that may also influence postsecondary outcomes. The theoretical frameworks and course taking effects in the literature provide justification for our quasi-experimental approach when examining the impact of high school course taking on postsecondary success.

Potential Explanations for High School Course Taking Effects

Research demonstrates that students who take a more intensive secondary curriculum are more likely to persist through college and earn a degree than students who take a less intensive curriculum (Adelman, 1999, 2006; Choy, 2001; Horn & Kojaku, 2001). There are at least two potential explanations for this relationship. The first explanation is that high school courses develop a student's human capital, providing him or her with skills and knowledge to be parlayed into future success (Rose & Betts, 2004). For instance, Algebra II may provide students with content knowledge that improves their performance in college-level quantitative coursework (Long, Iatarola, & Conger, 2009)—particularly general education math coursework that is required to earn a degree (Rech & Harrington, 2000). In turn, improved academic performance could lead students to integrate into college and commit to degree attainment (Bean, 1980; Tinto, 1975). Human capital development is related to the differential coursework hypothesis put forth by Karl Alexander and colleagues, which served as the basis for Adelman's *Toolbox* studies (1999, 2006). Alexander and colleagues propose that a student's academic preparation in high school is the most salient factor in his or her future educational attainment—much more salient than background characteristics such as race, class, and gender (Alexander, Riordan, Fennessey, & Pallas, 1982; Pallas & Alexander, 1983). When policymakers propose increased course taking requirements, they implicitly assume that higher-level courses lead to improved educational and labor market outcomes for students of all backgrounds by developing their human capital.

Another potential explanation for the relationship between curricular intensity and degree attainment is student self-selection. As we demonstrated in our discussion above, random assignment is not the typical mechanism determining student course placements or course choice. Students elect to take particular courses or are placed into courses according to a number of factors, including their prior achievement, scores on placement examinations, work ethic, parental involvement in the educational process, and the racial and social class composition of their schools. If these factors are also correlated with degree attainment, self-selection into courses during high school may positively bias our estimates of the causal effect of course taking on attainment (i.e., the results are upwardly biased).

It is important for researchers to determine if student self-selection or human capital development is largely responsible for any (hypothesized) positive relationship between curricular intensity and degree attainment because effective policymaking often requires a sound understanding of which practices improve educational outcomes. In studies that use observational data and analytical methods that do not strongly support causal inference, the greater the role of selection, the more the estimates of curricular intensity's effects on degree attainment may be biased. If positive selection bias is present, the individuals who are the most likely to experience the outcome of interest (e.g., graduate from college) are the individuals who are also the most likely to receive the treatment (e.g., select into taking Algebra II). Practices such as K-12 tracking increase the likelihood that only the most able and motivated students take intensive courses. If, prior to enrolling in Algebra II, these students are more dedicated to earning a bachelor's degree than their peers who take less intensive coursework, the observed positive association between course taking and educational attainment is attributable to the qualities of students who take intensive courses and not the courses per se. If positive selection bias is largely responsible for any observed relationship between curricular intensity and educational attainment, then state policies such as the Michigan Merit Curriculum that mandate a college preparatory curriculum for all students are unlikely to have the expected impact on college access and success.

However, positive selection is not the only potential reason for bias in studies of course taking effects. Negative selection occurs when the individuals who are the most likely to experience the outcome of interest (e.g., graduate from college) are the individuals who are the *least* likely to receive the treatment (e.g., select into taking Algebra II). For example, in states that offer merit-based financial aid programs that are distributed according to secondary (and postsecondary) GPAs, high school students who aspire to attend college and earn a degree may avoid challenging courses in high school to gain eligibility for financial aid. While we are unaware of a rigorous study that examines merit aid programs' impact on high school students' course taking behavior, Cornwell, Lee, and Mustard find evidence that the Georgia HOPE Scholarship causes some college students to take fewer general education courses in math and science (2006) and to reduce their course load and increase their rate of course withdrawals (2005). If negative selection biases the estimates in studies of course taking effects, policies like the Michigan Merit Curriculum may actually have a larger impact on college access and success than research that does not adjust for such selection would indicate.

High School Coursework and Postsecondary Educational Attainment

Many researchers have attempted to account for confounding factors in order to determine the causal impact of intensive coursework on the likelihood of completing a bachelor's degree. Arguably the most well-known and influential studies that

address this topic are Adelman's *Answers in the Toolbox* (1999) and *The Toolbox Revisited* (2006). In these studies, Adelman uses High School and Beyond (HSB) and National Education Longitudinal Study (NELS:88) data to examine the effect of student effort and high school course taking on their likelihood of college completion. As part of his analyses, he examines the impact of the highest level of math coursework taken by a student on his or her odds of degree attainment, controlling only for socioeconomic status. The results from the 1999 study using HSB data suggest that taking Algebra II or higher has a positive impact on degree completion. However, when analyzing NELS:88 data in 2006, Adelman suggests that taking Trigonometry or above has a positive effect on degree attainment, while taking Algebra II or lower has a negative effect. In summarizing his two studies, Adelman concludes that "the academic intensity of a student's high school curriculum still counts more than anything else in pre-collegiate history in providing momentum toward completing a bachelor's degree" (Adelman, 2006, p. xviii). This is a strong claim, given that the studies' regressions of highest level of math coursework do not account for precollegiate factors beyond socioeconomic status that are hypothesized to impact degree attainment, such as student educational aspirations or their high school contexts.

Like Adelman (1999, 2006), other researchers find that students who take higher-level courses in high school have more successful postsecondary outcomes than their counterparts who take lower-level courses (Bishop & Mane, 2005; Choy, 2001; Fletcher & Zirkle, 2009; Horn & Kojaku, 2001; Rose & Betts, 2001). The majority of these studies employ standard logistic/probit or multinomial regression techniques and control for several (possibly) confounding factors.² Like Adelman (1999), Rose and Betts (2001) employ High School and Beyond (HSB) survey data and find that math course taking influences students' bachelor's degree attainment, even after they control for observable factors such as student background, high school characteristics (including student-teacher ratio, high school size, and average per-pupil spending), and prior math course and standardized test performance. Their results suggest that an average student whose highest level of math is Algebra II is 12% more likely to earn a bachelor's degree than a similar student who only completes Algebra and Geometry.

However, other studies find that accounting for an array of background, academic, and/or state characteristics negates the relationship between taking intensive courses in high school and postsecondary persistence (Bishop & Mane, 2004; Geiser & Santelices, 2004). Using University of California (UC) and College Board data, Geiser and Santelices examine if taking advanced placement (AP) and honors courses in high school affects second-year persistence in college. They find that when high school GPA, socioeconomic indicators, and standardized test scores are included in their models, honors and AP courses are not significantly related to

² We use the term *standard regression* in the literature review to refer to nonexperimental studies that employ OLS or nonlinear regression without controls for student self-selection into coursework. Following the introduction of terminology related to causal inference, subsequent sections will employ the term *naïve* in reference to such studies.

whether UC students remain enrolled into their sophomore year. Similarly, after accounting for high school- and college-level factors—including the non-AP coursework taken by students—Klopfenstein and Thomas (2009) find a null effect of advanced placement coursework, including AP Calculus, on postsecondary persistence using Texas student unit record data.

Bishop and Mane (2004) examine the impact of high school curriculum policies on postsecondary outcomes using the same NELS:88 dataset that Adelman used in his 2006 study. They control for factors unaccounted for in other non-quasi-experimental studies, including Adelman's, such as student locus of control and state unemployment rates. They find that, controlling for student- and state-level variables, increases in the number of academic courses required to graduate from high school is not associated with college degree attainment. This result suggests that requiring all secondary students to take additional years of academic coursework will not increase college graduation rates, a result congruent with the explanation that selection is largely responsible for the positive association between course intensity and educational attainment.

As the aforementioned studies indicate, research provides conflicting evidence about whether high school courses have a causal impact on postsecondary completion. This conflicting evidence may arise for several reasons. First, the researchers use different datasets to investigate course taking effects. The datasets range from nationally representative to state specific and the points in time in which the surveys were administered span decades. Additionally, among researchers that use the same dataset, their effective samples often differ. For example, Adelman (2006) restricts his analysis of NELS:88 to students who attended high school through the 12th grade. This restriction excludes many dropouts, early graduates, and GED completers who may experience different effects of math coursework than traditional high school graduates. Conversely, Bishop and Mane (2004) include all students who were in the 8th grade in 1988 in their analysis of NELS data. Therefore, Adelman's and Bishop and Mane's estimates are based on very different samples.

Second, there is no clearly defined and universally agreed-upon theoretical model of high school course taking and educational attainment. As a result, each researcher proposes a different analytical model with a different set of controls for confounding variables, which means that each study likely contains a different degree of omitted variable bias.³ It is almost certain that these nonexperimental studies suffer from omitted variable bias because it is improbable that researchers are able to control for every covariate that is correlated with both high school course taking and degree attainment. However, some researchers may have been more effective than others in accounting for confounding factors in their models and therefore may provide less biased estimates of the causal effect of course taking on degree attainment. For instance, our review of the literature demonstrates that students who attend rural schools have less access to college preparatory courses than students

³ Cellini (2008) provides an excellent overview of omitted variable bias in education research. She also points to Angrist and Krueger (2001) for further elaboration on this topic.

who attend nonrural schools (Planty et al., 2007). Data indicate that rural residents also have lower levels of degree completion than nonrural residents (United States Department of Agriculture, 2004). Therefore, the urbanicity of students' communities could be a confounding factor in studies of the effect of course taking on degree attainment. Yet only two of the studies reviewed above control for the impact of hailing from a rural community.⁴

Although it is important to attend to the potential of omitted variable bias by inserting controls, such as urbanicity, we would like to caution readers against including controls that would not be theoretically expected to confound the effects of the treatment variable. The inclusion of such variables would have the potential to negatively impact the model in two ways. First, adding control variables to a regression that are correlated with other omitted predictors could introduce additional bias. If so, the coefficients of the newly added variables will not be accurate because they suffer from omitted variable bias also, due to their relation to other still excluded variables. Additionally, the inclusion of additional variables that are not significant predictors is likely to result in a loss of statistical efficiency and inflate standard errors. This will reduce the accuracy of all estimates in the model. Therefore, it is important to select control variables that are founded in the theoretical underpinnings of the model at hand. Absent knowledge of the true structural model of course taking and degree attainment in the population, it is impossible to know which of the course taking effects studies we reviewed provides the most accurate representation of the factors that predict college completion.

An additional issue with the aforementioned studies is that none employ strategies to eliminate the influence of unobservable factors on course taking and attainment. Some student characteristics may be difficult or impossible to obtain information about in observational datasets, but this does not change the fact that they are confounding factors (Cellini, 2008). Examples of potential unobservable factors in course taking effects research include a student's enjoyment of the learning process and a student's desire to undertake and persevere through challenges. It is likely that these unobservable factors contribute to student selection into high school courses and a student's subsequent choice to attain a bachelor's degree. However, none of the studies we examined that employ a standard regression approach accounted for a student's intrinsic love of learning or ability to endure through difficulties; the failure to account for these unobserved factors may bias the estimates that result from these studies.

To minimize omitted variable and selection bias to make stronger causal claims, researchers have recently employed quasi-experimental methods to examine the link between high school course taking and educational attainment. Attewell and Domina (2008) use propensity score matching (PSM) to study the impact of high school curriculum on student outcomes (for an example of the use of PSM in education research, see Reynolds and DesJardins (2009)). PSM may be an improvement over standard

⁴ Studies that controlled for urbanicity: Bishop and Mane (2004) and Rose and Betts (2001). In *Toolbox Revisited*, Adelman (2006) controls for whether students attended urban high schools in several regressions that were not discussed in this literature review.

regression techniques because it allows researchers to compare outcomes only among students who had similar characteristics before receiving a “treatment”—for example, a high school course or a series of courses—thereby potentially reducing the confounding effects of other observable factors. Attewell and Domina find that PSM estimates of course taking effects are generally smaller than those produced by previous studies, including Adelman’s, that are produced with standard regression. This suggests that a portion of the positive relationship observed between college preparatory courses and educational attainment in correlational studies may be due to the qualities of students who elect to take an intensive curriculum. However, as with all PSM studies, Attewell and Domina are unlikely to completely eliminate selection bias, as their propensity scores were based on a set of observable student background characteristics that may not adequately control for unobservable differences across students.

Altonji (1995) applied an instrumental variables approach in his study of high school curriculum effects on years of postsecondary education. Using data from the National Longitudinal Survey (NLS:72), he first estimates a standard OLS regression model, controlling for confounding student- and school-level factors. His results indicate that each additional year of high school math increases enrollment in postsecondary education by approximately one-quarter of a year. However, when he employs IV techniques using the average number of courses taken in a student’s high school as an instrument, his point estimates change: The effects of additional years of math coursework on degree attainment become minimal to nonexistent. Altonji’s results suggest that studies that fail to control for selection are upwardly biased. However, as Altonji notes, his IV is not optimal. The course taking behavior of students in specific high schools is likely related to unobserved characteristics of their communities, such as neighborhood or school district resources that in turn may influence the future educational outcomes of these students. Therefore, his IV estimates of course taking on years of postsecondary schooling may still be contaminated by selection bias. Including controls for community-level factors could help to mitigate this problem.

Many other researchers (mostly economists) have also employed instrumental variables to answer questions about postsecondary enrollment and attainment (Angrist and Krueger 1991; Card, 1995; Kane & Rouse, 1993; Lemieux & Card, 1998; Staiger and Stock 1997). To investigate the relationship between postsecondary attainment and earnings, for example, Card (1995) considers the distance from a student’s home to the nearest 2- or 4-year institution as an instrument for his or her likelihood of attending college. While his OLS estimates assert that those who attend college earn 7% more over a lifetime than those who do not, his IV model yields estimates closer to 13%—a difference of almost 50%.

Overview of the Empirical Example

Given the inconclusive results of prior studies, an important policy question remains unanswered: *What is the causal effect of high school courses on college completion?* To address this question, we focus our analysis on the effect of taking Algebra II

on a student's likelihood of earning a bachelor's degree. We selected the Algebra II course taking margin because, in the hopes of better preparing students for college and career success, almost half of the states in the United States currently mandate that students complete Algebra II in order to earn a high school diploma (Achieve, 2011). Consequently, a large portion of the nation's high school students stop taking math courses after taking Algebra II (Bozick and Ingels 2008; Dalton et al., 2007; Planty et al. 2007). Given the prominent role that Algebra II plays in educational policy, it is important to determine if this commonly mandated course improves student educational attainment. Previous research on the effects of specific math courses on degree attainment has been inconclusive, with earlier studies finding that taking Algebra II as the highest math course taken improves a student's odds of degree attainment (Adelman, 1999; Rose & Betts, 2001) and a later study finding that it does not (Adelman, 2006). These inconclusive results may reflect changing standards for math preparation over time if courses higher than Algebra II have become necessary for college-level success (Adelman). Additionally, the inconclusive results could be caused by differences in the samples used and the degree of omitted variable and selection bias present in their estimates.

To determine the causal effect of taking Algebra II on degree attainment over time, we employ data from two nationally representative surveys conducted a decade apart by the National Center for Education Statistics (NCES): the National Education Longitudinal Study of 1988 (NELS:88) and the Education Longitudinal Study of 2002 (ELS:02). Both surveys contain detailed high school transcript information for survey respondents. NELS follows a cohort of students who were in the eighth grade in 1988 through their sophomore year in 1990, their senior year in high school in 1992, and into college and the labor market in 2000. This allows us to observe which students complete a bachelor's degree in a reasonable time frame. ELS follows a cohort of students who were in the tenth grade in 2002. This cohort was issued follow-up surveys in their senior year of high school in 2004 and 2 years following high school graduation in 2006. Although ELS provides the most recent national data on high school student course taking, it does not contain information on bachelor's degree attainment because NCES has not yet released the third follow-up survey data.⁵ Therefore, we use persistence to the second year of college as a proxy for degree completion in the ELS data.

To address omitted variable and selection bias, we will conduct our analysis using an instrumental variables approach, to be discussed at length below. We will exploit the influence of local labor market conditions and youth labor laws early in a student's high school career to account (instrument) for his or her willingness to attempt math courses at the Algebra II level. These local labor market conditions are unlikely to remain fixed as students persist through high school and college and are thus unlikely to impact a student's ultimate educational attainment. In subsequent sections, we demonstrate how causal inferences can be made about course taking

⁵ The ELS:02 third follow-up survey is scheduled to occur during Summer 2012.

effects using an instrumental variables approach and local labor market conditions and youth labor laws as IVs. As a first step, we present a general introduction to concepts and terminology related to instrumental variable estimation approaches.

Instrumental Variables: Concepts and Terminology

Our goal is to determine whether taking Algebra II (or higher) has a causal effect on student postsecondary completion. However, a more utilitarian goal is to provide some guidance on the proper use of methods that will allow education researchers to make strong inferential statements about the effects of such “treatments” on student outcomes. If successful, we will provide higher education researchers with additional tools for their analytic “toolbox” so that their empirical work will be of the highest quality and able to inform policymakers about the likely effects of practices, interventions, and policies (e.g., high school curriculum standards) on student academic and labor market outcomes. The “wrench” we will add to the toolbox is known as instrumental variable estimation.

As noted earlier in the chapter, students take different levels of math courses while in high school and do so for a variety of reasons including differences in ability, motivation, and encouragement from others. The nonrandom assignment of students into courses presents the researcher with a challenge when attempting to determine the causal effect of a treatment (e.g., whether the student took Algebra II or higher or not) on an outcome (e.g., college completion) because observable (e.g., grades) and unobservable (e.g., motivation) factors may confound the typical multivariate analysis of the relationship between the outcome and the treatment. By employing an instrumental variable estimation strategy, we hope to mitigate this inferential problem.

Before diving into our investigation of the causal effect of taking Algebra II or higher on college completion, we will first discuss some important concepts and terminology related to making causal assertions using an instrumental variables approach. We will attempt to explain each of the concepts and terms using narrative, equations, and figures.

The Concept of a Counterfactual

Perhaps one of the most challenging issues in conducting causal research is determining the correct counterfactual—the group against which the outcomes of the treatment group (e.g., those who take Algebra II) are compared. Using a counterfactual allows researchers to think about the outcomes of those receiving treatment, had the treatment never occurred. In our case, the counterfactual helps researchers to explore the question, “what would the postsecondary outcomes of students who took Algebra II be had they not taken Algebra II?”

The concept of the counterfactual relies on the idea of *potential outcomes*. A potential outcome is defined as each of the possible outcomes of the dependent variable (e.g., whether or not a student completes college) in different states of the world—provided, of course, that observing different states of the world were possible. In our context, the “different states of the world” are whether or not the student takes Algebra II or higher or not.⁶

Consider again the example of Grace and Adam. Grace, as you recall, takes Algebra II in high school, whereas Adam does not. The best counterfactual for these two students would be themselves: Grace takes Algebra II in high school, and her eventual college completion is measured. Assuming the invention of a time machine, the researcher turns back the clock to high school and Grace takes a lower-level math course instead of Algebra II, and the researcher measures whether she completes college or not. The same strategy could be used for Adam: He takes Consumer Math, the clock is turned back to high school, he takes Algebra II instead, and we measure whether he completes college or not. We would then be able to compare Grace’s and Adam’s outcomes (college completion) under *both* conditions: taking Algebra II and not taking Algebra II. Absent time travel, this scenario is impossible.

We can also discuss the concept of the counterfactual formally. Let the outcome for Grace be Y_i^1 if she is exposed to the treatment (e.g., Algebra II) and be Y_i^0 if she is not (e.g., does not take Algebra II). Let T_i be a dichotomous variable that equals 1 if Grace takes Algebra II:

$$Y_i = \begin{cases} Y_i^1 & \text{if } T_i = 1 \\ Y_i^0 & \text{if } T_i = 0 \end{cases} \quad (6.1)$$

or

$$Y_i = Y_i^0 + T_i (Y_i^1 - Y_i^0) \quad (6.2)$$

The value $(Y_i^1 - Y_i^0)$ is the causal effect of taking Algebra II. However, the fundamental problem of causal inference, as mentioned above, is that we cannot observe both of these values of Y (takes Algebra II and does not take Algebra II) for Grace or Adam (Angrist & Pischke, 2009; Holland, 1986; McCall & Bielby, 2012; Rubin, 1974). A student either takes Algebra II, allowing us to observe Y_i^1 (which we would call the “factual”) but not Y_i^0 (which we would call the “counterfactual”), or, if they do not take Algebra II, we are able to observe Y_i^0 but not Y_i^1 .

Absent an experiment, a “naïve” solution to this problem is to compare the average value of Y for all of the students who take Algebra II to the average value of Y for those who do not:

$$E(Y_i | T_i = 1) - E(Y_i | T_i = 0) \quad (6.3)$$

⁶ See Holland (1986) for a much more complete discussion of Rubin causal model and the concept of the counterfactual.

	...the value of the outcome in the treated group is:	...the value of the outcome in the control group is:
For members of treated group (Algebra II)...	Known	Missing
For members of control group (not Algebra II)...	Missing	Known

(owing to Murnane & Willett, 2011)

Fig. 6.1 The concept of the counterfactual as a missing data problem (Owing to Murnane & Willett, 2011)

However, it is demonstrable that

$$E(Y_i | T_i = 1) - E(Y_i | T_i = 0) = \{E(Y_i^1 | T_i = 1) - E(Y_i^0 | T_i = 1)\} - \{E(Y_i^0 | T_i = 1) - E(Y_i^0 | T_i = 0)\} \quad (6.4)$$

Each of the elements is defined as above. The first term in brackets on the right-hand side of Eq. 6.4 is the average causal effect of Algebra II on those who took Algebra II. The second bracketed term is the difference in what the average value of Y would have been had the treated remained untreated (e.g., those who took Algebra II had not taken it) and the average value of Y for the untreated. In other words, the second bracketed term shows the difference in outcomes between the treated and the untreated that is due to students' background characteristics and other variables and not the treatment (Algebra II) itself. This second bracketed term represents *selection bias*, which will be discussed at greater length below (see McCall & Bielby, 2012, for additional details).

We can also think about the counterfactual as a missing data problem. That is, we have information about the effect of Algebra II on those who took it but are missing this information for those who did not. Conversely, we have information about the control condition for those who did not take Algebra II but are missing this information for those who did. This is depicted in Fig. 6.1.

Endogeneity (“The Selection Problem”) and Exogeneity

As noted above, high school students self-select into specific courses for a variety of reasons. Because the characteristics that lead to specific course selection are internal to the student, their selection into treatment (Algebra II) is *endogenous*. By this, we mean that a student's choosing to take Algebra II is the result of his or her own action (or possibly the action of his or her teachers or parents) who exist within the system (in this case, the education system) being investigated (Murnane & Willett, 2011). Endogeneity (which, for our purposes, is a synonym for *selection*)

hinders our ability to make causal assertions about the impact of a program or policy on a given outcome because it is unclear whether it is a student characteristic (observable or otherwise) that influences his or her outcome (college completion) or the treatment itself (Algebra II).

Consider our example in equation form:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 t_i + e \quad (6.5)$$

where:

y = postsecondary completion (the outcome of interest)

x_1 = an exogenous control variable (e.g., parents' education)

t_i = whether a student takes Algebra II or not (the treatment)

e = error term

The betas (β_0 , β_1 , and β_2) are parameters to be estimated— β_0 represents the Y intercept, β_1 is a coefficient for the relationship between our exogenous predictor and postsecondary completion, and β_2 is a coefficient on whether a student takes Algebra II. In the absence of random assignment to math classes, it is likely that many student characteristics that are excluded from this regression (ability, motivation, encouragement from parents—which can be assumed to be included in the error term) are related to a student's decision to take Algebra II. Therefore, t_i is an endogenous variable, and its coefficient (β_2) cannot be used to make causal claims about the relationship between Algebra II and college completion. Herein, we dub this the “naïve” statistical model because it does not account for the endogenous relationship between t_i and y .

Endogeneity in the regressor of interest (whether a student takes Algebra II) can potentially bias the magnitude of its estimate (β_2). In Eq. 6.5 above, it is likely that β_2 is too high—that the relationship between taking Algebra II and college completion is upwardly biased. Upward bias means that the relationship between Algebra II and college completion appears to be too strong. There are likely many factors other than taking Algebra II (ability, motivation, and encouragement) that may influence whether or not a student completes college. On the other hand, the estimate (β_2) will be biased downward if it underestimates the relationship that exists between taking Algebra II and college completion.

Exogeneity exists when assignment to treatment (taking Algebra II) happens through a mechanism that is outside the system being investigated: when a lottery, for example, or an otherwise random draw assigns students to a particular math class. Under this condition, assignment is unrelated to student characteristics, the opinions and/or encouragement of teachers and parents, and the characteristics of the math classes themselves. Exogenous variation, to continue with our example, would mean that students are assigned to take Algebra II or a lower-level math class in a way that has nothing to do with their ability, motivation, or how much encouragement they receive from their parents.

Consider Eq. (6.5) above, now assuming that students are assigned to treatment exogenously. Because students are randomly assigned to Algebra II or a lower-level math course, all of their observed and unobserved characteristics should, on average, be statistically identical. This means that we should have treatment and control

groups that are identical on average. If so, any bias in the estimates of the effect of Algebra II on college completion will be eliminated—a stark difference from when assignment to treatment is endogenous—and should yield estimates of the relationship between the treatment (Algebra II) and the outcome (college completion) that are much more accurate.

Instrument

To address issues of endogeneity (selection) when attempting to make causal assertions about the relationship between taking Algebra II in high school and completing college, it may be useful to employ an instrumental variable (an “instrument” or an “IV”). An instrument is defined as a variable that is unrelated to the error term and related to the outcome only through the treatment variable. Again, consider Equation 6.5 above. An appropriate instrument must be unrelated to e (the error term) and related to y (postsecondary completion) only through t_i (whether a student takes Algebra II). An instrument allows a researcher to minimize bias due to endogeneity by identifying a source of exogenous variation and uses this exogenous variation to determine the impact of a treatment, policy, or program (e.g., Algebra II) on an outcome (e.g., postsecondary completion).

Using our example, we consider both labor market conditions and youth labor laws during the student’s 10th grade year as instruments for their probability of taking Algebra II. While students are enrolled in high school, local labor market conditions may affect their college preparation decisions, and these decisions may subsequently alter their chances for college access/completion. For example, a strong local labor market when a student is in 10th grade may entice students to avoid a college preparatory curriculum, reasoning that many job opportunities will exist without a college education. On the other hand, an identical student facing a weaker labor market in 10th grade may be more likely to enroll in a college preparatory curriculum, as employment prospects will likely dim without a college education. Additionally, youth labor laws when a student is in high school may influence the amount of time he or she is able to work outside of school. These opportunities for work (or lack thereof) may also influence student decisions about taking (or not) college preparatory coursework, as they may choose to spend time working as opposed to focusing on more challenging coursework.

It is important to note that although the IV approach is an econometric method used by many researchers, there is considerable debate about the application of this methodology. We will discuss this debate below, as well as alternative approaches for making causal claims about the relationship between treatments and outcomes.

Historically, methodologists and researchers considered an instrument to be valid if it met the following two conditions:

1. The exogeneity condition: The instrument must be correlated with Y_i only through t_i and must be uncorrelated with any omitted variables. The key assumption when using an IV is that the only way the instrument affects the outcome is through the treatment (Newhouse & McClellan, 1998).
2. The relevance condition: The instrument must be correlated with t_i , the treatment (Algebra II).

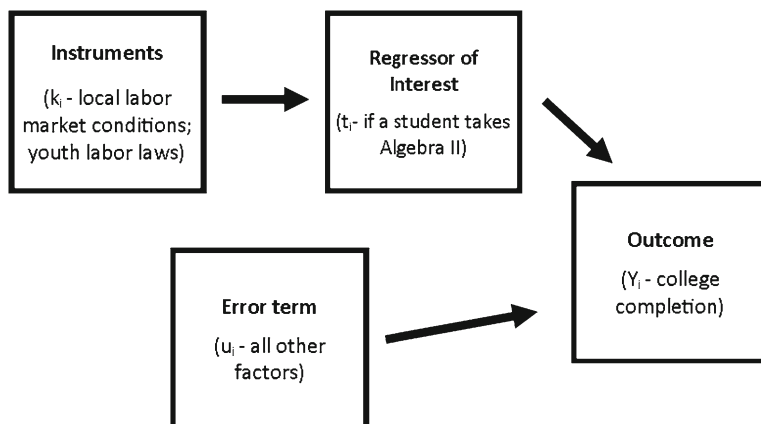


Fig. 6.2 Two conditions for a valid instrument

These relationships are depicted in the figure below (Fig. 6.2).

The relevance condition can be verified empirically by determining whether and, if so, how strongly the instrument is correlated with the policy variable of interest (in our case, whether students take Algebra II.) If a strong correlation exists, the relevance condition is met. The exogeneity condition, however, cannot be tested empirically because it is stated in terms of the relationship between the instrument and the *population* parameters. Population parameters cannot be observed, as researchers have access only to *sample* data. As such, it is impossible to investigate correlational relationships between the instrument and unobservable parameters. Therefore, this condition requires that researchers think about the potential relationships between the IV, the omitted variables, the treatment, and the outcome. In our running example, some questions to be asked might be the following: How do local labor markets impact college going among high school graduates? How do they impact the quality of the neighborhoods in which students live, a variable that may be omitted from the model? If a logical case can be made and defended, the exogeneity condition is considered to have been met as well. Absent random assignment, this assumption is more challenging to justify than the relevance assumption, and IV exogeneity is often contested among communities of scholars.

Methods to Employ the IV Framework

One can employ an instrumental variables approach using a variety of regression-based techniques, some of which will be discussed at length below. One very common method that researchers use is two-stage least squares (2SLS) regression. 2SLS is performed in two steps that happen sequentially: In the first stage, the main variable

of interest (Algebra II) is regressed on the instrumental variable and any other variables that we think might help explain why students take Algebra II. The results of this regression yield a probability of taking Algebra II for *all* students in the sample. These predicted values are then used in place of the (in our case) dichotomous treatment variable (Algebra II) in a second stage. This and other methods for using IV will be discussed in much greater detail below, in light of the methods employed to explore our causal question of interest: What is the causal relationship between high school course taking and college going?⁷

Data

Before entering into a discussion of the procedures for estimating IV models, we will briefly describe the data and computational methods we employed to apply and test different modeling approaches to IV analysis. The running example will employ data from two National Center for Education Statistics (NCES) datasets: the National Educational Longitudinal Survey of 1988 (NELS:88) and the Educational Longitudinal Survey of 2002 (ELS:02). These datasets provide nationally representative samples of students who are longitudinally tracked beginning in their eighth grade year. NELS:88 tracks students through high school and postsecondary education and into the workplace. ELS:02, the most currently available of the NCES longitudinal datasets, has collected and distributed its most recent survey 1.5 years after students were expected to complete high school. The data provides detailed information on students' high school-level course taking in addition to a number of other academic preparation variables, demographic variables, and a range of postsecondary outcomes of interest. We leverage this detailed longitudinal data to construct a number of models testing the influence of high school-level course taking, specifically Algebra II, on student probabilities of obtaining a bachelor's degree.

In our analyses, we focus on two particular outcomes. Our primary outcome of interest is bachelor's degree attainment; however, this outcome is only available in the NELS:88 data because the most recently available wave of the ELS:02 data only interviewed students 1.5 years after their expected high school graduation date. Therefore, using the ELS:02 data, we use as a proxy for degree completion a variable indicating whether a student persisted from the first to second year of postsecondary education. We will reestimate this model when college completion data is available.

Our variable for bachelor's degree attainment was constructed from the NELS Postsecondary Education Transcript Study (PETS) data file. The variable was coded as a dummy variable, "1" if a student attained a bachelor's degree within 8 years of their expected high school graduation and "0" otherwise.

⁷Murnane and Willett (2011) provide an excellent description and visual representation of a 2SLS framework in Chapter 10 of their *Methods Matter* text.

The first- to second-year persistence variable for ELS:02 was developed in two stages. First, a variable was created to indicate the first month, in 2004 or 2005, that a student was enrolled in a postsecondary institution. Then, a dummy variable was created to indicate if that student was enrolled in a postsecondary institution 12 months after their initial month of enrollment, coded “1” if the student was still enrolled 12 months later and “0” otherwise.

One concern with each of these dependent variables, as is a concern with any regression-based modeling technique, is that they are both dichotomous and therefore might not be appropriately estimated using techniques based on ordinary least squares (OLS; or “linear”) regression. While strong arguments have been made in favor of using OLS with dichotomous dependent variables (see Angrist & Pischke, 2009, p. 103) and we do so in this study, we also estimate some IV models using methods that deal with the nonlinearity when estimating dichotomous dependent variables.

The Endogenous Independent Variable

The independent variable of interest in our analysis is high school-level mathematics course taking, specifically whether or not a student took an Algebra II course (or higher) or not in high school. It is operationalized as a dummy variable, coded “1” if a student took more than 0.5 Carnegie units, equivalent to high school credits, in Algebra II while in high school and “0” otherwise.

As was discussed above, this variable is expected to be endogenously related to postsecondary persistence and degree attainment because students self-select into high school courses. In an attempt to account for this endogeneity, we employ instrumental variables in order to more accurately estimate the causal relationship between course taking and degree attainment. The selection of the instrumental variables employed is discussed in detail below.

Exogenous Independent Variables

A set of exogenous controls were incorporated in each model estimated. The inclusion of controls that are expected to significantly predict the outcome variable is an important aspect of reinforcing the exogeneity of the other variables in the model. If factors that are truly related to the dependent variable were excluded, the risk of omitted variable bias in the model estimates would be increased. Therefore, controls included in our models were selected based on their expected relationship with both the dependent variable of interest and the treatment variable. These controls include mathematical ability, measured as a student’s quartile ranking on the NCES-standardized high school mathematics exam (8th grade for NELS and 10th grade for ELS), race/ethnicity, mother’s level of education, and socioeconomic status quartile. State and birth year fixed effects were also included to account for impacts of policies that may differentially influence students’ decisions and/or outcomes based on age and/or state of residence. Each of these controls is included as a predictor in both the

first and second stage equations, as will be discussed below. See Table 6.1 for descriptive statistics for variables included in our models.

Software and Syntax

To conduct this analysis, we chose to use the statistical program Stata. Stata is one of many statistical programs capable of performing the analyses conducted herein (e.g., SPSS, SAS, or R). However, Stata provides a number of preprogrammed instrumental variable modules that are readily accessible and accompanied by clearly written help files and interactive examples that provide a better gateway to IV modeling than might be available in other programs. Additionally, advanced programming options and Stata's use of open source user-created routines allow for a great deal of flexibility in the number of approaches that can be applied.

Along with each of our analyses, we provide a set of annotated Stata syntax (see Appendix A) that provides step-by-step examples of the code that is necessary to estimate the IV models discussed below.

Assumptions of IV models

As is discussed above, the general objective of applying IV methods is to account for potential bias in traditional regression estimates that are due to the presence of endogeneity. Below, we provide a detailed discussion of a number of assumptions that IV models and instruments are required to meet in order to account for endogeneity and provide more accurate estimates. We begin by discussing tests for the presence of endogeneity in the model. We then move on to discuss the traditional two-assumption approach to IV modeling that dominated IV literature in econometrics for much of the twentieth century. Next, we introduce a relatively new five-assumption approach that acknowledges potential issues with relying only on the two-assumption approach and expands our thinking about the role of assumptions when estimating treatment effects. We then evaluate our empirical example using the five-assumption approach, thereby providing conceptual and empirical support (or not) about our ability to estimate the causal effect of Algebra II course taking on first- to second-year persistence and bachelor's degree attainment.

Testing for Endogeneity

The application of IV modeling techniques is driven by the assumption that at least one of the independent variables in a model, here Algebra 2 course taking, is endogenous. When there is endogeneity present, naïve regression-based techniques (see Eq. (6.5)) produce inconsistent estimates of all coefficients (Wooldridge, 2002). However, employing IV techniques also results in a loss of statistical

Table 6.1 Descriptive statistics

	NELS		ELS	
	Mean/%	S.D.	Mean/%	S.D.
<i>Dependent variables</i>				
Obtained bachelor's degree (within 8 years)	32.66%			
Persisted to second year			58.16%	
<i>Endogenous independent variable</i>				
Algebra 2	48.14%		49.54%	
<i>Instrumental variables</i>				
County unemployment rate: 1989 (2001)	5.77%	2.39%	4.96%	1.68%
16 years of age in 10th grade	15.41%		22.75%	
Unemployment rate X 16 y.o.a.	0.91	2.36	3.83	2.56
<i>Exogenous independent variables</i>				
Math test quartile 1 (lowest) (excluded group)	17.63%		16.98%	
Math test quartile 2	24.06%		35.14%	
Math test quartile 3	27.61%		38.05%	
Math test quartile 4 (highest)	30.70%		9.83%	
Male	47.17%		49.66%	
Black/African American	7.82%		12.72%	
Asian/Pacific Islander	8.07%		9.63%	
Hispanic	10.84%		14.36%	
Native American	1.25%		0.84%	a
Mixed or other race			4.81%	
White (excluded group)	72.02%		57.65%	
SES quartile 1 (lowest) (excluded group)	24.06%		22.14%	
SES quartile 2	27.25%		22.35%	
SES quartile 3	26.29%		23.07%	
SES quartile 4 (highest)	22.40%		26.93%	
<i>Mother's education</i>				
Did not complete high school (excluded group)	25.09%			
High school diploma	35.14%		25.76%	
Attended 2-year institution			11.53%	
Associates degree	12.05%		10.16%	
Attended 4-year institution	7.95%		9.77%	
Bachelor's degree	12.57%		17.54%	
Master's degree	5.54%		6.50%	
Terminal degree	1.66%		1.94%	
County unemployment rate: 1992 (2004)	7.51%	2.82%	5.73%	1.67%

^aExcluded from multivariate analyses due to small sample size

efficiency (i.e., inflation of standard errors) when compared to linear regression, so it is important to be certain that the variables that are thought to be endogenous are in fact so. If we knew the true population parameters were not endogenous, then the application of IV approaches would reduce efficiency without accounting for bias; thus, one would be better off to apply a simple (naïve) OLS regression.

There are a number of tests that can be applied to assess the endogeneity of explanatory variables. Many are made available through Stata's `estat endogenous` postestimation command (see StataCorp, 2009, p. 757). Additionally, the estimation strategy of some IV approaches, namely, control function approaches (discussed in detail below), directly tests the endogeneity of the independent variable of interest (e.g., Algebra II). Conducting these tests is an essential step when applying the IV approach. If we find that Algebra II is in fact exogenous (in the population), then the use of an IV estimator would be inefficient, inflating our standard errors, without accounting for any potential bias from the more efficient OLS estimator. However, these endogeneity tests are sensitive to the strength of our instruments. If the instrumental variables are only weakly related to the treatment, there is a high potential to falsely reject the endogeneity assumption and assume that the treatment variable is exogenous. Therefore, it is always of primary importance to consider not only statistical tests but conceptual evidence when evaluating the endogeneity of a variable. While the statistical tests might not fully support the presence of endogeneity, this may be largely due to a lack of statistical power in the test, not a truly exogenous treatment variable.

The Two-Assumption Approach

Traditional conceptions of IV models (e.g., Cameron & Trivedi, 2005; Greene, 2011; Wooldridge, 2002) required that instrumental variables meet two assumptions in order to be considered valid. Assume the following simple linear regression:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 t + e \quad (6.6)$$

If the researcher believes that t is endogenous, then the estimates of β_0 , β_1 , and β_2 will be biased if standard OLS regression methods are employed. One way to remove this bias is to apply an IV method. To do so, we must find an instrument, z , that meets the following assumptions:

A1. Exclusion Restriction

This assumption requires that the instrumental variable is appropriately excluded from the estimation of the dependent variable of interest. When this assumption is satisfied, it guarantees that the instrument, z , only affects the dependent variable, y , through its effect on t .

More formally, there must be no correlation between z and e in Eq. (6.7):

$$\text{Cov}(z, e) = 0 \quad (6.7)$$

This assumption is the basic requirement that all exogenous variables in Eq. (6.7) are required to meet. Additionally, the exclusion of z from Eq. (6.7) provides that z has zero effect on the dependent variable, y , when controlling for the effect of all other independent variables. Combining the lack of correlation between z and e and the exclusion of z from (6.7), assumption A1 guarantees that the only effect of z on y is through its effect on t .

A2. Nonzero Partial Correlation with Endogenous Variable

The second assumption requires that the instrument (z) has a measurable effect on the endogenous variable (t). To examine this relationship, the endogenous variable (t) is regressed on the instrument (z) and the other predictor variables (x_1) from Eq. (6.7) in what is referred to as the reduced form equation, below:

$$t = \delta_0 + \delta_1 x_1 + \theta_1 z_1 + \rho \quad (6.8)$$

This assumption requires that $\theta_1 \neq 0$. At the most basic level, this means that the instrument must be correlated with the endogenous variable, that is, that the coefficient on the IV (θ_1) in Equation (6.8) must be nonzero after controlling for all other exogenous variables (x_1) in the model. Meeting assumptions A1 and A2 is argued to ensure that the IV model is appropriately identified (see Wooldridge, 2002, p. 85) and the instrument is valid.

Although assumptions A1 and A2 have been used to judge whether an instrument is valid, advances in econometrics have driven an interest in applying IV models to estimate causal effects of endogenous variables (t) on dependent variables of interest (y). In order to accomplish this, the traditional IV model must be situated within a broader causal framework based on counterfactuals discussed above. This requires that IV models meet a set of five assumptions in order to estimate causal relationships.

The Five-Assumption Approach

An underlying assumption of the two-assumption model is that the effect of a treatment is the same for all individuals in the sample. No matter who the individual is that receives the treatment, the average influence of the treatment on their outcome of interest is expected to be the same. If this assumption holds, then we are able to estimate the average treatment effect (ATE) for all individuals in the sample. However, Angrist, Imbens and Rubin (1996) argue that treatment effects are likely to be heterogeneous, such that treatments will have differential effects on four different groups of individuals: always-takers, never-takers, defiers, and compliers. Always-takers and never-takers are unaffected by the instrument, such that they

will always behave in the same way given a particular treatment. In our example, and using only the county-level employment (not the labor market laws IV) as an example of our instrument, always-taker students will always take Algebra II, whereas never-takers will never take Algebra II, regardless of local labor market conditions. Defiers behave in a manner that is opposite to expectations. Defiers would not take Algebra II when county-level unemployment rates were high but would take Algebra II when unemployment rates were low. Compliers behave according to expectations. When unemployment rates are high, they are more likely to take Algebra II, and when unemployment rates are low, they are less likely to take Algebra II, because they will be entering the labor market after high school instead of attending college.

Among these treatment groups, a causal IV model is only able to estimate the effect of the treatment on compliers, and this estimate is referred to as the local average treatment effect (LATE) (Angrist et al., 1996; Angrist & Pischke, 2009). To estimate the LATE, Angrist et al. argue that the traditional IV model must be embedded within a broader causal structural model referred to as the Rubin causal model (Holland, 1986). Our discussion earlier of causal effects and counterfactuals is a simplified version of the Rubin causal model. This model expands on the traditional two-assumption approach and employs a set of five assumptions that, when met, allow for the estimation of a causal LATE using an IV method. The five assumptions are:

A1b. Stable Unit Treatment Value Assumption (SUTVA)

This assumption requires that the influence of the treatment be the same for all individuals and that the treatment of one individual is not influenced by other individuals being treated. There are two primary concerns when evaluating SUTVA. First, Angrist et al. (1996) and Porter (2012) cite circumstances where groups of individuals are treated as a unit, as opposed to treatment to each individual independently, as possible violations of this assumption. For example, if we randomized students into treatment and control groups by classroom within a school, then we would expect that there might be interactions among teachers instructing the control and treatment group classes. These effects, which are often referred to as “spillovers,” alter the impact of the treatment and controls if the treatment or control teachers alter their administration of the treatment based on their contact with the other teachers.

The second concern deals with how the treatment itself is administered. The SUTVA requires that the implementation of the treatment must be consistent across all treatment groups. Using a clinical example, if the treatment is a drug administered in pill form, then each of the pills given to the treatment group must be exactly the same. If some pills had differing levels of chemicals than other pills, SUTVA would be violated. Therefore, we must consider how the administration of treatments may differ in order to evaluate our model with respect to A1b.

A2b. Random Assignment

This assumption requires that the distribution of the instrumental variable across individuals be comparable to what would be the case given random assignment. In the case of a dichotomous treatment, this can be described as each individual having an equal probability of being treated or untreated. More formally,

$$\Pr(t = 1) = \Pr(t = 0) \quad (6.9)$$

where $\Pr(t = 1)$ is the probability of being treated and $\Pr(t = 0)$ is the probability of not being treated. Any situation in which an individual would have an influence on their level of the instrument would violate this assumption. For example, a student's college major (Pike, Hansen, & Lin, 2011) would not satisfy this assumption because the student plays a role in selecting the instrument.

A3b. Exclusion Restriction

This assumption parallels assumption A1 in the two-assumption approach from the previous section in that the instrument (z) needs to be uncorrelated with the error term (e) in the second stage equation (6.7). More plainly, assumption A3b requires that the instrument (z) is appropriately excluded from the second stage equation (6.7). As discussed above, this assumption ensures that the only effect that the instrument, z , has on the dependent variable, y , is through its effect on the endogenous independent variable, t , in the reduced form Eq. (6.8).

A4b. Nonzero Average Causal Effect of the Instrument on the Treatment

Also drawing from the two-assumption approach (the “relevance” condition), this assumption requires that there be a nonzero relationship, and preferably a strong relationship, between the instrumental variable and the endogenous independent (or treatment) variable, such that $\theta_1 \neq 0$ in Eq. (6.8).

A5b. Monotonicity

Monotonicity assumes that the instrument, z , has a unidirectional effect on the endogenous variable, t . This requires that the relationship between the instrument, z , and the endogenous variable, t , meet one of the following criteria:

$$\theta_2 \geq 0 \quad (6.10)$$

or

$$\theta_2 \leq 0 \quad (6.11)$$

What is required for this to be the case is that the relationship between t and z , as represented by θ_2 , must have only one sign, either positive or negative, for *all* individuals in the sample.

This assumption stems from our discussion of heterogeneous treatment effects from above. Angrist et al. (1996) describe four groups: always-takers, never-takers, compliers, and defiers. Always-takers and never-takers have predetermined patterns of behavior that are uninfluenced by the instrument. In our running example, always-takers will always take Algebra 2 and never-takers will never take it, and the instrument (local labor market conditions and/or labor laws) will have no influence on these students' decision. Compliers' and defiers' behavior is, however, influenced by the instrument. Compliers will alter their behavior in the direction we would expect from the underlying theory. Using our running example, we would expect compliers' probability of taking Algebra 2 to rise (fall) as the local unemployment rate increases (decreases). Defiers behave, however, in ways that do not conform to a priori expectations. Using our example, if defiers existed (and we do not believe they do in our case, to be explained in more detail below), we would expect that as the local unemployment rate increased (decreased), their probability of taking Algebra 2 would fall (rise). In order for the assumption of monotonicity to hold, defiers cannot exist because the influence of the instrument on the treatment would not be unidirectional.

In many cases, the assumption of no defiers is a reasonable one, because their behavior would be in contradiction to their own interests. Considering our empirical example, the behavior of a defier would decrease their expected wages and employment prospects. Students with more promising job prospects while in high school would not take advantage of them but instead invest more time in school, whereas students with worse employment prospects in high school would reduce their investment in schooling to increase work time at low-wage jobs or time looking for non-existent jobs. In both cases, defiers reduce the potential utility they could obtain from the way they allocate their time.

While assumption A5b is required in order to clearly discern the causal relationship between the endogenous independent variable and the dependent variable of interest, the presence of defiers does not necessarily result in biased estimates. The presence of defiers acts to attenuate the estimated relationship between the instrument and the endogenous independent variable, ultimately resulting in underestimated causal relationships as long as the proportion of defiers does not exceed the proportion of compliers in the sample (Angrist & Pischke, 2009). Therefore, when considering the validity of an instrument in relation to A5b, a researcher must evaluate if there is a realistic expectation that the instrument will have a unidirectional impact or if the presence of heterogeneous treatment effects allows for defiers which will alter the estimates.

Moving on toward the estimation of our IV models, below we apply a number of tests of endogeneity to our empirical example to ensure that our Algebra II course taking variable is endogenously related to bachelor's degree attainment and first- to second-year persistence. Then, we examine whether there is conceptual and/or empirical evidence in support of the five assumptions discussed above.

Table 6.2 Tests of the endogeneity of Algebra II course taking

	<i>N</i>	Robust χ^2	<i>p</i>	Robust <i>F</i>	<i>p</i>	GMM <i>C</i>	<i>p</i>
Persistence (ELS:2002)	12221	8.363	0.004	8.325	0.004	5.36	0.021
Degree attainment (NELS:88)	5491	3.276	0.071	3.245	0.071	8.607	0.003
		Control function residual (LPM second stage)	<i>p</i>	Control function residual (logit second stage)	<i>p</i>		
Persistence (ELS:2002)	12221	−0.396	0.005	−2.012	0.009		
Degree attainment (NELS:88)	5491	−0.359	0.072	−4.383	0.009		

Tests of Endogeneity

Table 6.2 presents the results of a number of test statistics evaluating the endogeneity of our Algebra II variable in models of both bachelor’s degree attainment and first- to second-year persistence. The null hypothesis for each test is that the Algebra II variable is exogenous which would mean we need not be concerned about bias due to endogeneity and it would be unnecessary to employ IV methods. The robust χ^2 test, robust *F* tests, and GMM *C* statistic are products of Stata’s *estat endogenous* postestimation commands available following the estimation of 2SLS and GMM IV models (to be discussed in greater detail below). Each of these tests of endogeneity approaches or exceeds conventional levels of statistical significance, suggesting that Algebra II course taking is endogenously related to persistence and degree attainment. The lower half of Table 6.2 presents coefficients and significance values estimated in two control function IV models estimated. In a control function approach, the residuals from the first stage model are inserted into the second stage model to “control” for the endogeneity between Algebra II course taking and the dependent variable. Whereas the control function approaches will be discussed more fully below, here it is important to note that the coefficients associated with the residuals in the second stage equation provide another test of the endogeneity assumption. If the coefficient on the residuals in the outcome equation is significantly related to the dependent variable, there is evidence that the Algebra II variable is endogenous. In all cases, these estimates approach or exceed conventional levels of statistical significance, providing evidence that the Algebra II variable is endogenously related to degree attainment and persistence.

Given the evidence that Algebra II is endogenous, especially when estimating persistence, it is likely that traditional correlational techniques, such as OLS regression, will produce biased estimates. Therefore, we apply IV models as one potential

means for reducing the bias in our estimates. However, we must first evaluate both our selection of instrumental variables and the specification of our model with respect to the five-assumption approach discussed above.

Selection of Instruments

Instrument selection is the key to and generally the largest obstacle when applying IV techniques. Many higher education studies use secondary datasets and the variables provided therein. Thus, our options for finding legitimate instruments are often limited due to at least two frequently occurring phenomena. First, the secondary data we often have access to is collected to study education issues. As such, many of the variables included in these datasets are highly correlated with each other, thereby mitigating the possibility of using any of these variables as instruments. Second, researchers may not have access to extant data, such as the unemployment data used in our study, that provide variables with sufficient exogenous variation that is needed for a valid instrument.

To determine whether an instrument is valid, both conceptual and empirical evidence should be provided in support of its application. Below, we discuss the conceptual foundations provided in defense of our instruments. Then, we consider how our empirical example holds up to the five assumptions when employing the counterfactual IV approach.

Conceptual Justification

From a conceptual point of view, our selection of instruments is based on a simplified two-period model of time allocation. We assume that students allocate their time between school, work, and leisure while enrolled in school (period one) and between work and leisure once they finish schooling (period two). We also assume that students who allocate more time to schooling while in high school take more difficult courses.

In our model, h'_s denotes how much time a student devotes to school in a period, h'_w denotes how much time is allocated to work in period t , l' denotes how much time is devoted to leisure activities in period t , and t can equal 1 or 2, depending on whether we are referencing time period one or time period two.⁸

To simplify, we assume that school, work, and leisure comprise all of a student's time in period one and work and leisure take up all of their time in period two. Formally, we have

$$h_s^1 + h_w^1 + l^1 = T^1 \quad (6.12)$$

⁸ Schooling is only permitted in period 1 within our model; therefore, h_w^t only ever takes on the form of h_w^1 .

and

$$h_w^2 + l^2 = T^2 \quad (6.13)$$

where T denotes the total amount of time available to a student in that period.

We also assume that a student's overall utility (U) is a function of consumption, c , and leisure. Consumption is defined as a combination of wages, w , and hours worked, formally represented by

$$h_w^t * w^t = c^t \quad (6.14)$$

Additionally, we assume that wages in period 2 increase with the amount of time allocated to schooling in period 1 ($f(h_s^1)$). So a student will attempt to maximize their utility, U , according to

$$\max_{h_w^1, h_s^1, h_w^2} U(w^1 * h_w^1, T^1 - h_w^1 - h_s^1) + \beta * U(f(h_s^1) * h_w^2, T^2 - h_w^2) \quad (6.15)$$

Here, β represents a discount function that depreciates the value of future utilities with respect to current utilities. Therefore, individuals attempt to obtain the highest overall combined utility in period one and discounted utility in period two. However, the utility obtained in period two is a factor of both the discount rate and the amount of time allocated to schooling in period one.

While the above model can be understood to be driven strictly by student choice, where students allocate their time according to intrapersonal preferences and discount rates, there are also exogenous factors that drive time allocation, particularly with regard to work in period one. One of these is the availability of work. If students are unable to obtain employment in period one, then they will allocate less time to work and more time to school in period one, and they are likely to increase the quantity and/or difficulty of the courses that they take in high school. We operationalize the exogenous influence of availability of work in this model by using the unemployment rate (%) in the county where a student resides in the 10th grade.

Second, state policies often place limitations on the amount of time that students can allocate to work based on their age. For example, the state of California limits students who are under the age of 16 to working only 3 h per day and a total of 18 h per week, whereas 16- and 17-year-olds can work up to 4 h per day and 28 h per week. Similar laws exist in most other states and are expected to impact students' allocation of time to both schooling and work. However, the degree to which the laws impact students' allocation of time is expected to vary by state. We statistically control for this variation by including state-level fixed effects, which account for differences in policy impacts at the state level. This allows us to exploit the exogenous influence on the allocation of time to work by including an instrument that indicates whether a student is 16 years of age at the beginning of the 10th grade. We also provide an additional IV by including the interaction between the county-level unemployment IV and the 16 years of age instrument. This interaction term allows the influence of the county-level unemployment rate on Algebra 2 course taking to differ for students who are 16 years of age at the beginning of the 10th grade and

those that are not. We hypothesize that changes in the unemployment rate will result in greater changes in Algebra 2 course taking among 16-year-olds who can allocate more time to work than their counterparts under the age of 16.

Evaluating Our Example with the Five-Assumption Approach

Below, we use our empirical example to discuss in detail how to evaluate a causal IV modeling approach with respect to the five assumptions from Angrist et al. (1996). We employ both empirical and conceptual evidence to assess whether our instruments and modeling approach meet each assumption. Then, once the assumptions are evaluated, we discuss a number of estimation approaches employing IV and compare results across the different approaches.

A1b. SUTVA

To satisfy assumption A1b, we must ensure that the effect of our treatment is consistent across all individuals in the sample. The treatment in our example is Algebra II course taking. So we must consider if the impact of Algebra II course taking on bachelor's degree completion and first- to second-year persistence should be expected to be consistent across all students in our sample.

As was discussed above, the threat of spillover effects when treatments are administered in group settings has the potential to violate this assumption. In such cases, individuals within treatment and nontreatment groups may interact with each other (e.g., sharing information pertinent to the treatment), which might contaminate the treatment effect.

In our empirical example, the treatment is students taking an Algebra II course. The possibility of spillover would be unlikely in this case. In order for the Algebra II curriculum to spill over into other, non-Algebra II courses, contact between Algebra II instructors and non-Algebra II instructors would have to result in Algebra II concepts being taught in lower-level mathematics courses.

The other concern related to SUTVA is that the administration of the treatment is consistent across all treated groups. We expect the administration of the Algebra II curriculum to be consistent at the district level, though it may vary to some degree between districts. To account for this, we include state-level fixed effects in each of our models to control for such extraneous variation. Differences in administration between teachers within districts can be understood as a form of measurement error. Using national-level surveys, such as NELS and ELS, the values that we are actually able to measure (Algebra II course taking) and the actual treatment, what Algebra II curriculum students were exposed to, are going to be subject to some random variation. However, as long as this variation is approximately random, average treatment effects can still be estimated consistently. Given the structure of the administration and our included statistical controls, we believe the SUTVA assumption is satisfied.

A2b. Random Assignment

Next, we consider whether our instruments approximate random assignment, such that any individual in the sample has an equal probability of having any level of the instruments. More specifically, in our example, we need to determine whether county-level unemployment rates and/or whether a student is 16 years old at the beginning of 10th grade is determined in such a manner that they are randomly distributed across students.

First, we consider the county-level unemployment rate. The random nature of this variable is tied to the fact that it is driven by residence. It is unlikely that 10th grade students will travel across county lines for employment. Similarly, it is unlikely that parents will choose to move their students when they are in 10th grade to improve the quality of their educational environment, as residential mobility decreases as children get older, especially between counties (Long, 1972). Therefore, each student's level of local unemployment is determined by their residence. Prior research has used the exogenous variation of a student's residence as an instrument for a number of outcomes (Card, 1995). As local labor conditions, and other factors related to residence, change independently of both students' course taking choices, their persistence in college, and eventual bachelor's degree completion, we believe assumption A2b is satisfied.

Second, we need to examine whether a student's age at the beginning of 10th grade is determined in such a manner that it is (basically) randomly distributed across the sample. We feel it is likely that a student's birth month and year are determined by factors that approximate random assignment. Given the conceptual rationale provided above, we see no cause for serious concern about violations of assumption A2b.

A3b. Exclusion Restriction

Now we consider whether our instrumental variables' only impact on the dependent variable is through their relationship with the endogenous independent variable of interest. Using our example, we must discern if the only impact that our instruments, county-level unemployment rates and being 16 years of age when a student enters 10th grade, have on our outcomes of interest (persistence and bachelor's degree attainment) is through their influence on Algebra II course taking. Statistically, this can be stated as evaluating whether the instruments are correlated with the error term in the second stage equation (see Eq. 6.2 above). Empirically, this assumption can, in fact, never be tested (Angrist & Pischke, 2009; Porter, 2012) because the error in the second stage equation is a population parameter that we do not know the value of; thus, we can only make assumptions about its distribution. However, there are statistical tests (discussed below) that can provide evidence to support our conceptual argument for the validity of these instruments.

In order to discern if these instruments are (theoretically) correlated with the error term in the outcome equation, we must consider what the error term actually

represents. While referred to as an error, this term in fact consists of any number of independent variables that influence our dependent variable of interest (persistence or bachelor's degree attainment) but are either immeasurable or not included our model. Often such variables are referred to as "omitted" variables. A classic example of an omitted variable in many education research studies such as ours is student motivation. Observational data often include any number of demographic and academic characteristics about students, but measures of student motivation to succeed are often not available. Thus, measures of motivation are typically omitted from statistical models even though they are likely to be highly related to many of the educational outcomes we study. In order to conceptually evaluate whether the instruments we employ are correlated with the error term, we consider whether they are likely to be correlated with any variables that have been excluded from our model but are likely to have an impact on the outcomes of interest (persistence and bachelor's degree attainment).

First, we consider county-level unemployment rates when students are in 10th grade. We expect that unemployment when a student is in 10th grade is likely to be correlated with unemployment when a student is in 12th grade, or even later, when they will be making decisions about college enrollment and persistence, which would ultimately influence degree attainment. However, we are actually able to include county-level unemployment rates when students are in 12th grade, which removes that variable from the error term and therefore removes the potential correlation. In doing so, we provide conceptual and some statistical support that our unemployment instrument meets assumption A3b.

Next, we consider whether students being age 16 at the beginning of 10th grade is correlated with the second stage error term. Research demonstrates that the age of a student when they begin school is often predictive of their subsequent academic performance (Angrist & Krueger, 1991). And one's academic performance in high school affects one's probability of achieving a bachelor's degree (Astin & Oseguera, 2005; Camara & Echternacht, 2000). Therefore, if measures of academic performance are omitted from the model and subsumed into the error term, we might expect that age when beginning 10th grade will also be correlated with the error term. However, we include controls in our models for academic performance, using students' scores on the NCES-standardized mathematics examination, therefore removing performance from the error term and decreasing the chances that age in 10th grade is endogenous.⁹ Including a control for academic performance provides us more confidence that this instrument meets assumption A3b.

If we are able to find at least two instruments for each endogenous regressor, then there are statistical tests available to examine whether this assumption is

⁹ Whereas mathematics test scores are not the only potential measure of academic performance, they have been shown to be a strong predictor of postsecondary outcomes (Deke & Haimson, 2006) and are likely to have the highest correlation with our treatment variable. Therefore, the inclusion of this variable is likely to have the greatest impact on omitted variable bias related to academic performance.

Table 6.3 Overidentification tests of instrumental variables

	2SLS		LIML		GMM	
	Sargan-Hansen	<i>p</i>	Anderson-Rubin	<i>p</i>	Hansen's J	<i>p</i>
Persistence (ELS:2002)	2.265	0.322	2.234	0.327	2.265	0.322
Degree attainment (NELS:88)	Sargan-Hansen	0.140	Basmann 1.110	0.330	Hansen's J	0.972
			Anderson-Rubin			
			3.15	0.207		
			Basmann 1.55	0.212		

tenable. The most common of these tests is the overidentification (over-ID) test. An IV model is considered to be “just identified” if it includes one instrumental variable for each endogenous variable in the model. When the number of instruments exceeds the number of endogenous variables, the model is referred to as “overidentified.” If the number of endogenous variables exceeds the number of instruments, the model is “underidentified” and IV methods cannot be applied. When a model is overidentified, a Sargan-Hansen test of the overidentifying restrictions can be applied. In this test, the residuals from the second stage equation (6.6), $y - \hat{y}$, are regressed on the exogenous control variables from the model, x_1 . The test statistic is calculated by multiplying the number of observations in the model by the R-squared statistic. The over-ID statistic is distributed asymptotically as χ^2 with degrees of freedom equal to the number of instruments minus the number of endogenous variables. The null hypothesis for this test is that the instruments are correctly excluded from the estimation of the dependent variable. However, this test does have its limitations as it still requires that we assume one instrumental variable is properly excluded from the second stage equation and then evaluates each additional IV with respect to the first. If the first IV does not in fact meet assumption A3b, then the over-ID test does not provide useful information. Stata provides a number of other similar over-ID tests for different IV models (see StataCorp, 2009, p. 757), the results of which we will discuss below.

Overidentification statistics for a number of the regressions we estimated are displayed in Table 6.3. Across the different IV models we estimated (to be discussed in detail below), none of the over-ID test statistics met conventional levels of significance. Again, we have to assume that the first IV, county-level unemployment in 10th grade, is properly excluded from second stage equation. Therefore, the over-ID tests provide statistical evidence that the additional IVs are properly excluded from the second stage equation. Given the empirical evidence and our conceptual evaluation of the instruments, we assert that assumption A3b is satisfied.

However, it is also important to note that significant overidentification statistics should not be the basis for fully rejecting the use of an instrument. The basis of the over-ID test is that the inclusion of a second instrument does not alter the estimates of an original model with only one instrument. However, it could be that two valid instruments could have differential impacts on individuals' probability of treatment, and those differences could be even greater when considering the combined impact of the two instruments. While such differences would likely result in significant over-ID statistics, they would not justify the removal of either instrument from the IV model.

A4b. Nonzero Average Causal Effect of the Instrument on the Treatment

This assumption requires our instrument(s) to have a nonzero causal relationship with our endogenous treatment variable. In our example, the combined effect of our instruments on Algebra II course taking must be statistically significant. Tests for this assumption rely on the two-stage nature of many IV models. By evaluating the fit statistics of the first stage model, we are able to evaluate the correlation of the instrumental variables with the endogenous treatment variable. Using OLS in the first stage, the R^2 statistic calculates the percentage of the variation in the endogenous treatment variable that is explained by all exogenous variables included in the first stage. The R^2 statistic represents the strength of the relationship of *all* of the exogenous variables with the endogenous treatment variable; the primary concern of assumption A4b is the relationship of the *instruments* to the treatment variable. Partial- R^2 statistics provide a measure of the proportion of the variance of the endogenous treatment variable that is explained by the instruments used as regressors in the first stage equation. Higher partial- R^2 statistics represent a stronger relationship between the instruments and the endogenous treatment variable (i.e., Algebra II). Additionally, we can evaluate the F statistic, which provides a joint significance test of the relationship of the instruments to the endogenous treatment. This statistic should achieve and, researchers suggest, exceed conventional levels of statistical significance to demonstrate that instruments are properly specified (Hall, Rudebusch, & Wilcox, 1996). Each of these statistics can be obtained in Stata using the *estatfirststage* command following an IV modeling routine. Additionally, Wald tests of the joint significance of instruments can be computed for models where the first stage and second stage are estimated independently.

Test statistics evaluating the strength or relevance of our instrumental variables across the different models we estimated are displayed in Table 6.4. The R^2 and adjusted R^2 statistics for both samples indicate that our first stage models are accounting for between 23 and 25% of the variation in Algebra II course taking when all exogenous variables are included. The partial- R^2 statistics suggest that our instruments are accounting for about 0.4–0.3% of the total variation in the models. This raises some concern about the strength of our instruments, but we can use a number of other test statistics to resolve those concerns. Stock, Wright and Yogo (2002) suggest that the F statistics should be larger than 10 to ensure

Table 6.4 Tests of instrument relationships with Algebra II course taking

	R ²	Adjusted R ²	Partial R ²	F	<i>p</i>	Wald	<i>p</i>
Persistence (ELS:2002)	0.242	0.2372	0.004	16.370	0.000	18.050	0.000
Degree attainment (NELS:88)	0.277	0.267	0.003	5.855	0.000	5.850	0.000

against any bias induced because of weak instruments. The instruments in the first- to second-year persistence model, using the ELS:02 data, exceed this value, and therefore we accept that the instruments in that model satisfy assumption A4b. However, the *F* statistic for the bachelor’s degree completion model is only about six, suggesting that the relationship between our instruments and endogenous independent variable may be weaker than desired and could result in biased estimates (see Angrist & Pischke, 2009, p. 208).¹⁰ Although this is concerning, we are able to test for the potential for weak instrument bias in two ways suggested by Angrist and Pischke (also see Murray, 2006, for additional details of dealing with weak instrument problems). First, we estimate a two-stage least squares (2SLS) model (to be discussed in detail below) using only one instrument (the 16-year-old IV), because the 2SLS approach is nearly unbiased in the presence of weak instruments when the model is just identified (i.e., when the number of IVs equals the number of endogenous regressors). We then compare the coefficient estimates of the treatment effect (i.e., the coefficient on the Algebra II variable) from this model to the estimates produced by the 2SLS model that includes all of the instruments. When we include being 16 at the beginning of 10th grade as our instrument, we find that the just-identified model estimates an effect of 0.61 compared to the overidentified model estimates and effect of 0.55. We will discuss the substantive meaning of these results in the results section, but both models produce comparable estimates of the effects; therefore, we have some evidence that our treatment effect estimate from the bachelor’s degree attainment model is not severely biased due to a weak instrument problem.

Angrist and Pischke (2009) also suggest that models estimated using limited information maximum likelihood (LIML) are less likely to be biased due to weak instruments than 2SLS models. Examining the estimates from each of these models in Table 6.6, the LIML model estimates an effect of 0.64 of Algebra II on bachelor’s degree attainment, which is very close to the estimate produced by both the just-identified and overidentified 2SLS models. Therefore, we are confident that there is a significant relationship between our instruments and our endogenous treatment variable and that A4b is satisfied.

¹⁰ Stock and Yogo (2005) provide another method for evaluating the strength of instruments through the use of first stage estimates. However, those test statistics are not available in Stata when robust standard errors are used to account for survey design (as in our analysis). See StataCorp (2009, p. 765) for aid in interpreting these statistics.

A5b. Monotonicity

Next, we examine whether our instruments have a monotonic influence on high school mathematics course taking, such that increases in unemployment never result in decreases in mathematics course taking and that students who are 16 years of age in 10th grade are always less likely to take Algebra II. Our instrument is unlikely to satisfy this assumption fully, as there are assuredly students who decrease course taking levels in the face of increasing unemployment and 16-year-olds who are more likely to take Algebra II than younger students. However, we believe this set of students is likely to represent a very small portion of our sample; in which case, the presence of defiers simply places an upward bound on our estimate of the treatment effect (Angrist & Pischke, 2009; Porter, 2012). As defiers act in contradiction to the expected influence of the instrument, the estimated relationship between the instrument and the endogenous variable would be expected to be in the opposite direction to that of compliers (i.e., negative influence of unemployment on Algebra II and negative influence of being 16 on Algebra II). Mathematically, if we were to combine the estimated effects for each individual, the opposing signs would simply push the average effects of the instruments toward zero. As long as compliers outnumber defiers in our sample, we will be able to obtain at least a lower-bound estimate of the causal effect of mathematics course taking on postsecondary enrollment. Therefore, expecting that defiers are likely to account for only a very small portion of our sample, we believe that our instruments satisfy A5b.

We have evaluated the appropriateness of our IV approach for our empirical example, next we discuss a number of IV estimation strategies that can be employed to estimate causal treatment effects, and then we discuss the results using each of these estimation procedures.

Approaches to Modeling Causal Effects

Our empirical strategy is to estimate a number of different models testing the influence of high school-level mathematics course taking on first- to second-year persistence and bachelor's degree attainment. Our estimation strategy is to begin by estimating a "naïve" statistical model using ordinary least squares (OLS) regression which does not account for the potential endogeneity of the regressor of interest (Algebra II). Next, two-stage least squares (2SLS) is employed, the first stage of which generates predicted probabilities of the Algebra II course taking using exogenous variation from the instruments and other controls. These predicted probabilities are then included as a regressor in the second stage equation. We then estimate a set of models that simultaneously estimate the IV model (limited information maximum likelihood (liml) and generalized method of moments (GMM)) and account for potential limitations of the basic 2SLS approach. We then employ a control function IV approach in which the residuals from the first stage regression are saved and then used as a regressor in the second stage. Doing so helps to "control" for the endogeneity of the instrumented variable (the Algebra II variable). Finally, we estimate another control function model which employs logistic regression in the second stage to account for

the nonlinear relationship between the dichotomous dependent variable (i.e., persistence and degree attainment) and the included regressors. We employ these different methods to check the sensitivity of the results to the choice of method and pay particular attention to the estimates for the Algebra II variable for any differences that may emerge across the different model specifications.

Naïve Model: Using OLS Regression

The dependent variables of interest, persistence or degree attainment, are binary, and in such cases when OLS regression is applied, the model is referred to as a linear probability model (LPM). The LPM is formally represented by

$$Y = \alpha + \beta X + \delta T + \varepsilon \quad (6.16)$$

where Y , the dependent variable, is estimated as a function of a set of explanatory variables, X , and a treatment variable, T , that equals 1 when an observation (student) receives the treatment (takes Algebra II) and 0 when it does not. The traditional LPM regression framework does not account for any potential endogeneity that might exist between the treatment and the outcome variable (more accurately, between the treatment and the error). However, we might expect that there are excluded factors that directly relate to both the level of T and the level of Y . These excluded variables are absorbed into the error term, ε , which may be correlated with T . As was discussed above, an explanatory variable that is correlated with the error term is endogenous, and failure to adequately correct for this will result in a biased estimate of the coefficients for all explanatory variables included in the model.

We use the LPM model as a baseline model to evaluate the degree of bias in the point estimates that results from our failure to account for any endogeneity. As the LPM model assumes no endogeneity, the presence of endogeneity will result in biased estimates. When we apply other estimation procedures that account for endogeneity and reduce this source of bias, we expect that the estimates will differ from those produced by the LPM model. Using the LPM as a baseline, we will be able to clearly evaluate those differences by comparing the point estimate from the LPM to those obtained by employing the IV techniques.

The following set of statistical approaches employ a variety of instrumental variable techniques in order to account for endogeneity and in so doing provide less biased estimates of the “causal” relationship between the treatment and the outcomes of interest.

Two-Stage Least Squares

Two-stage least squares (2SLS) estimation, estimated using Stata’s *ivregress 2sls* command, is performed exactly according to its name. The estimation process occurs in two steps. The first stage is formally described below:

$$\hat{T} = \gamma + \beta X + \theta Z + \omega \quad (6.17)$$

The endogenous variable, Algebra II (T), is regressed on all of the exogenous variables, X , and a set of instruments, county-level unemployment, whether the student was 16 at the beginning of 10th grade, and the interaction of unemployment and age 16(Z), using a linear probability model (LPM). From this equation, estimates of T , denoted \hat{T} , are produced. The initial values of T are understood to be composed of both endogenous and exogenous variations. When we use instruments to generate estimates of T , we decompose that variation into the exogenous portion, which is contained in the predicted values, \hat{T} , and the endogenous portion, which is absorbed into the residuals, $T - \hat{T}$. We then use the exogenous predicted values of T in the second stage model, formally displayed below:

$$Y = \alpha + \beta X + \delta \hat{T} + \varepsilon \quad (6.18)$$

In this stage, the dependent variable of interest, Y (e.g., persistence or graduation), is regressed on the same set of exogenous variables, X , used in stage one, plus the predicted values of T produced by the first stage regression. Because the endogeneity in T has been reduced by replacing it with \hat{T} , we expect that the estimate of δ will more closely approximate the causal influence of T on Y than when employing the naïve statistical model.

Simultaneous IV Models

Here, we discuss two simultaneous IV estimation procedures which build upon the 2SLS model: limited information maximum likelihood (LIML) and generalized method of moments (GMM). The LIML estimator is easy to estimate using the *ivregressliml* command in Stata; the results produced are robust to weak instrument problems (Rothenberg, 1983), and Monte Carlo simulations suggest the method is “less prone to bias and has more reliable standard errors” (Sovey & Green, 2011, p. 7). The GMM approach can be invoked in Stata with the *ivregressgmm* command. GMM provides a useful alternative to 2SLS when the independence assumption is violated (Baum, Schaffer, & Stillman, 2003). Given the possibility of an independence assumption violation due to the clustering of students within schools, this estimator is employed. Each of these commands is very simple to invoke by requiring the user to provide only the dependent variable and three sets of regressors: exogenous controls, endogenous independent variables, and the instruments.

Control Function Models

Another type of IV approach that produces equivalent estimates to the 2SLS approach is the control function technique (Card, 2001). However, the control function approach provides a greater degree of flexibility in the modeling of both the first and second stages, as will be discussed below. Here again, we estimate an OLS first stage model described formally as

$$\hat{T} = \gamma + \beta X + \theta Z + \omega \quad (6.19)$$

We retain the estimated *residuals* from this regression, $T - \hat{T}$, rather than the predicted values, \hat{T} , that were used in the 2SLS approach. These residuals are then inserted as a “control” in the second stage regression:

$$Y = \alpha + \beta X + \delta T + \gamma(T - \hat{T}) + \varepsilon \quad (6.20)$$

The inclusion of the residuals from the first stage controls for the endogenous variation in T , allowing δ to be interpreted as an estimate of the causal relationship between the treatment and the outcome variable of interest. In addition, the γ coefficient also provides a statistical test for the endogeneity of T . That is, if γ is statistically significant, then we are able to reject the null hypothesis that T is exogenously related to Y .

The control function approach suffers from improper standard errors due to the failure to account for uncertainty introduced because of estimating the first stage regression. However, employing Stata’s bootstrapping procedure allows us to produce appropriate standard errors. By drawing a predetermined number of equally sized random samples from our data, with replacement, and then taking the average values of both point estimates and standard errors, bootstrapping provides a computationally intensive alternative to improve estimation.

Additionally, the control function approach allows for us to account for the non-linearity of our dichotomous dependent variables. While each of the other procedures has relied on an OLS regression in the second stage, here we use a logistic regression which accounts for the dichotomous nature of both bachelor’s degree completion and first- to second-year persistence. While it has been argued that the linear probability model is suitable for dichotomous dependent variables, logit models may provide different estimates under some circumstances (Angrist & Pischke, 2009). Therefore, we include control function models employing both an LPM and logit regression in the second stage to evaluate any differences in point estimates due to the choice of regression method used.

Below, we provide a detailed discussion of the application of the IV approaches discussed above. We focus specifically on interpretation of the point estimates and marginal effects and when relevant discuss any important differences among these results.

Results

We discuss a number of descriptive statistics from each of our datasets to allow an introduction to the data and variables included in the multivariate models. Then, we move into a discussion of the estimates produced by the multivariate models. We first present the findings of our analysis modeling persistence from the first to second

year of postsecondary education using the ELS:02 data. These models of student persistence serve as a proxy for our primary outcome of interest, bachelor's degree attainment. This is due to a data limitation—students have not yet been followed long enough to determine whether they have completed a degree. We will then discuss the results of our degree attainment analysis using the NELS:88 data.

Descriptive Statistics

Table 6.1 presents descriptive statistics for the variables included in our models across the two samples: NELS, conducted from 1988 to 2000, and ELS, conducted from 2002 to 2006. The distribution of the dependent variables illustrates why policymakers are concerned about the consistently low educational attainment of students in the United States. Approximately one-third of students in the NELS sample attained a bachelor's degree by the year 2000, 8 years after their expected high school graduation, and less than two-thirds of students in the ELS sample persisted to their second year of college by 2006. The distributions of other key variables are fairly similar between the two samples. For instance, despite educational stakeholders' growing emphasis on providing a college preparatory curriculum for all students during the 1980s and 1990s, the sample statistics suggest that the percentage of students who take Algebra II remained at about 48–50% between the two surveys.

The mean unemployment in a student's county of residence was lower for both NELS and ELS participants during their 10th grade years than in their 12th grade years. Specifically, the mean local unemployment rate was 5.77% when NELS participants were in the 10th grade (Fall 1989) and 7.51% when NELS participants were in the 12th grade (Spring 1992). ELS participants generally experienced more favorable economic conditions than NELS participants: The mean unemployment in a student's county of residence was 4.96% in the 10th grade (2001) and 5.73% in the 12th grade (2004). Tenth grade unemployment rates had standard deviations of 2.39% and 1.68% in NELS and ELS, respectively, suggesting a relatively high level of variation in county-level unemployment in both samples. Our conceptual model suggests that the low local unemployment rates for students who were in the 10th grade in 1992 and 2001 may have induced students to enter the labor market and avoid intensive math coursework.

Additionally, there was a large shift in the proportion of students who were 16 years old in the 10th grade between the two surveys. In 1990, when NELS participants were in the 10th grade, 15.41% of sophomores were 16 years old. However, in 2002 when ELS students were in the 10th grade, 22.75% of sophomores were 16 years old. This means that fewer sophomores in the ELS sample than the NELS sample were impacted by policies that limit employment hours for youths aged 15 and under. Other explanatory variable sample statistics indicate that college students in the United States became increasingly racially diverse, but less socioeconomically diverse, in the decade between the two surveys.

Multivariate Models

A full table of results from both the NELS and ELS surveys is displayed in Tables 6.5 and 6.6. To allow comparisons across the models, all results are presented as marginal effects and may be interpreted as the percentage change in the probability of obtaining a bachelor's degree (NELS) or persisting to the second year (ELS), given a one-unit change in the explanatory variable (*ceteris paribus*). For example, the coefficient for the male variable (-0.082) in the OLS column in Table 6.5 (the ELS results table) indicates that men have about an 8% lower probability of persisting from the first to second year than women. To foreshadow the results, across all of the models estimated, taking Algebra II increases the probability that students will earn a bachelor's degree or persist to their second year of postsecondary education.

First- to Second-Year Persistence Results

Examining the results of the naïve OLS model, we find that students who take Algebra II have probabilities of persisting from the first to second year that are approximately 20% age points higher than students who did not take Algebra II. However, because this model does not account for the likelihood of selection bias, this estimate is likely biased. Therefore, we estimate a number of IV models that account for any endogeneity that may be present.

The naïve model of first- to second-year persistence presented in Table 6.5 underestimates the effect of the treatment, Algebra II course taking, on persistence. In fact, each of the instrumental variable models indicates that the treatment effect is nearly three times that of the OLS model. In the 2SLS, LIML, GMM, and control function (LPM) models, students who take Algebra II are estimated to have between a 59 and 60 percent higher probability of persisting to the second year than students who did not take Algebra II. The control function model using a logit approach in the second stage, accounting for the nonlinearity in our dependent variable, estimates a 52% increase in the probability of persisting when students take Algebra II as opposed to when they do not.

A number of other variables have consistent impacts on the probability of persisting from the first to the second year. Higher performance on the NCES-standardized mathematics exam is positively related to persistence: Those students in the 3rd and 4th quartiles are, on average, about 12% and 22% (respectively) more likely to persist than students scoring in the lowest (1st) quartile. The effects of mathematics performance on persistence appear to decrease substantially between the OLS and the IV models, decreasing in magnitude in all cases. This suggests that the endogeneity in the OLS model is causing bias in the estimates not only of the Algebra II coefficients but also of many other regressors of interest.

Men are consistently less likely than women to persist to the second year, by about 6.5%. Students who identify as Asian or Pacific Islander are about 10% more likely to persist than Whites. Socioeconomic status has a consistent impact on

Table 6.5 Models of the impact of Algebra II course taking on first- to second-year persistence (ELS:02)

	LPM	2SLS	LIML	GMM	Control function (LPM 2nd stage)	Control function (logit 2nd stage)
Algebra 2	0.197 ***	0.589 ***	0.607 ***	0.597 ***	0.591 ***	0.522 ***
Math test quartile 2	0.144 ***	0.056 ***	0.052 ***	0.054 ***	0.058 ***	0.051 ***
Math test quartile 3	0.290 ***	0.131 ***	0.123 ***	0.128 ***	0.131 ***	0.106 ***
Math test quartile 4	0.390 ***	0.227 ***	0.219 ***	0.224 ***	0.227 ***	0.246 ***
Male	-0.082 ***	-0.066 ***	-0.065 ***	-0.065 ***	-0.062 ***	-0.064 ***
Black/African American	0.021 ***	0.010 ***	0.010 ***	0.010 ***	0.011 ***	0.014 ***
Asian/Pacific Islander	0.116 ***	0.099 ***	0.098 ***	0.099 ***	0.096 ***	0.109 ***
Hispanic	-0.017 ***	-0.020 ***	-0.020 ***	-0.020 ***	-0.022 ***	-0.017 ***
Native American	-0.117 **	-0.082 **	-0.081 **	-0.080 **	-0.081 **	-0.084 **
Mixed or other race	-0.048 *	-0.030 *	-0.029 *	-0.029 *	-0.035 *	-0.033 *
SES quartile 2	0.066 ***	0.056 ***	0.055 ***	0.055 ***	0.057 ***	0.049 ***
SES quartile 3	0.151 ***	0.123 ***	0.122 ***	0.123 ***	0.120 ***	0.097 ***
SES quartile 4	0.235 ***	0.204 ***	0.202 ***	0.203 ***	0.200 ***	0.182 ***
Mother's education						
High school diploma	0.013 ***	0.006 ***	0.006 ***	0.006 ***	0.005 ***	0.010 ***
Attended 2-year institution	0.006 ***	-0.004 ***	-0.005 ***	-0.004 ***	-0.005 ***	-0.001 ***

Associates degree	0.019	-0.004	-0.005	-0.005	-0.005	0.000
Attended 4-year institution	0.038	0.023	0.023	0.023	0.022	0.024
Bachelor's degree	0.064	***	*	*	0.044	*
Master's degree	0.068	**	0.054	*	0.053	*
Terminal degree	0.046	0.05	0.05	0.05	0.049	0.050
County unemployment rate: 2004	-0.001	-0.005	-0.005	-0.005	-0.005	-0.004
Control function residuals					-0.396	**
Constant	0.048	0.043	0.044	0.043	0.033	-2.624
N	12253 ^a	12221	12221	12221	12221	12221

^aDifferent sample sizes in LPM model due to missing values on the IVs that resulted in the deletion of 32 observations in the IV models

* p<.05

** p<.01

*** p<.001

Table 6.6 Models of the impact of Algebra II course taking on bachelor's degree attainment (NELS:88)

	LPM	2SLS	LIML	GMM	Control function (LPM 2nd stage)	Control function (logit 2nd stage)
Algebra 2	0.192***	0.55*	0.636*	0.67**	0.550***	0.826***
Math test quartile 2	0.033**	-0.034	-0.05	-0.08	-0.034	-0.026
Math test quartile 3	0.088***	-0.055	-0.089	-0.113	-0.055	-0.107
Math test quartile 4	0.277***	0.082	0.035	0.008	0.082	-0.071
Male	-0.072***	-0.063***	-0.06***	-0.05***	-0.063***	-0.052***
Black/African American	0.005	-0.004	-0.006	-0.054	-0.004	-0.002
Asian/Pacific Islander	0.145***	0.113	0.105**	0.099***	0.113***	0.083**
Hispanic	-0.008		-0.002	-0.009	-0.003	0.004
Native American	-0.099**	-0.088*	-0.085*	-0.09*	-0.088*	-0.166*
Mixed or other race						
SES quartile 2	0.037**	0.032*	0.031	0.025	0.032*	0.056**
SES quartile 3	0.117***	0.095***	0.09***	0.076**	0.095***	0.095***
SES quartile 4	0.295***	0.26***	0.252***	0.204***	0.260***	0.194***
Mother's education						
High school diploma	0.026	0.014	0.011	0.008	0.014	0.024

[illegible]

^aDifferent sample sizes in control function (logit 2nd stage) due to deletion when cases perfectly predicted by the set of covariates

*p<.05

^{**}
^{**}
 $p < .01$

p<.001

persistence, such that individuals in higher SES quartiles are 15–20% more likely to persist than those in the lowest quartile. Finally, students whose mothers obtained either a bachelor's or master's degree are 4–6% more likely to persist than those whose mothers did not obtain a high school diploma.

Bachelor's Degree Attainment Results

We find results comparable to those above when estimating models of bachelor's degree completion using the NELS:88 data (see Table 6.6). The naïve model estimates about a 19% increase in the probability of completing a 4-year degree among students who have taken Algebra II, compared to their peers who have not. However, when accounting for the endogeneity of the Algebra II variable, our instrumental variable results suggest a much stronger relationship between Algebra II course taking and degree completion. Again, the 2SLS, LIML, GMM, and control function (LPM) models estimate an effect that is nearly three times larger than the estimate produced by the naïve OLS model, ranging from about a 55% increase in the probability of degree completion to a 67% increase. Further, our control function model that employs logistic regression in the second stage estimates a marginal effect of Algebra II course taking on bachelor's degree attainment of .82—more than four times the size of that estimated produced by the OLS model.

Across all IV models, we find that male students are 5–7% less likely than female students to complete their bachelor's degrees. Students who are of Asian or Pacific descent are 8–10% more likely than their White peers to complete a degree, whereas students of Native American descent are slightly less likely to graduate than Whites (holding all else equal). Higher-income students (SES quartiles 3 and 4) are between 10 and 26% more likely to earn a bachelor's degree, relative to their peers who are of lower income.

Future Research, Implications for Policy, and Conclusions

This analysis employed an instrumental variables approach to determine the causal effect of high school courses on college completion. Specifically, we examined the impact of taking Algebra II or higher on a student's probability of postsecondary attainment. In congruence with several prior studies (Adelman, 1999, 2006; Klopfenstein & Thomas, 2009; Rose & Betts, 2001), our “naïve” regression models indicate that students who take more intensive high school math courses have increased probabilities of degree completion compared to students who take less intensive math courses. Specifically, both the NELS and ELS naïve OLS analyses indicate that students who take Algebra II have a 19–20% higher probability of degree completion than students who do not take Algebra II. However, when we use local labor market conditions and student age in the 10th grade as instruments to account for the fact that student course taking is endogenous, we find that taking Algebra II has a much

greater impact on a student's probability of degree completion than the naïve model results indicate. The NELS and ELS IV models indicate that taking Algebra II can increase a student's probability of degree attainment by as much as 50–80%. In sum, using the most recent course taking data available and accounting for endogeneity, we find that taking Algebra II in high school has a positive effect on a student's likelihood of degree attainment. That the estimated positive effect of Algebra II course taking was larger in the IV estimates than the OLS estimates suggests that negative bias (the naïve estimates are lower than the “true” causal estimates) may be present in course taking effects studies that do not account for selection and omitted variable bias. Our naïve estimates obscure the fact that the students who are least likely to take intensive math coursework (marginal students) appear to benefit greatly from taking Algebra II while in high school.

These findings have implications for policies that aim to increase college completion. As noted in the introduction to this chapter, several states and school districts have implemented mandatory college preparatory requirements over the past several years. These requirements are an extension of state-mandated increases in the number of years of math coursework needed to earn a diploma that have occurred since the release of *A Nation at Risk*, the implementation of *No Child Left Behind*, and the publication of influential research from the US Department of Education (Adelman, 1999, 2006). Absent course taking effects research that strongly supports causal inference, policymakers who hope to improve student educational and labor market outcomes on a large scale have implemented these curriculum mandates on the basis of findings from correlational studies. Our study provides rigorous evidence that, at least for students who are at the margin of taking Algebra II or not, mandating them to take this course may indeed produce positive individual and maybe even societal benefits.

It is important to note that high school courses may have a causal impact not only on degree completion but on other outcomes that are of interest to state and federal policymakers. For instance, intensive high school courses may improve students' critical thinking skills, high school graduation rates, access to college, or performance in college-level coursework. In a related study, Kim, Kim, DesJardins and McCall (2012, April) use the same IVs employed in this study on Florida student unit record data and find that taking Algebra II has a positive impact on the odds of enrolling in a 2- or 4-year college, as opposed to not enrolling in college at all. They also find that their IV model provides larger estimates of math course taking's effects than a naïve statistical model, which suggests that the students who are least likely to take challenging courses appear to benefit from them the most in gaining access to postsecondary education.

To help inform policymakers, researchers should continue to explore how high school courses causally affect student educational attainment. Future studies could examine whether intensive courses in subjects other than math—such as science, English, or foreign languages—contribute to increased degree attainment. Additionally, it is important to determine if dropping out of the math course taking pipeline at different stages has different effects for students who attend different types of institutions. For example, it is possible that taking Algebra II has a positive

effect on the degree attainment of students who attend 2-year and nonselective 4-year institutions but no effect on the attainment of students who attend selective 4-year colleges. It is possible that students who attend selective 4-year colleges may need to remain in the math pipeline through Trigonometry or Precalculus to improve their odds of degree attainment. Additionally, given the large disparities in course taking among disadvantaged and advantaged students, it is important that researchers determine whether the causal impact of coursework varies across student socio-economic status and race/ethnicity (Dalton et al., 2007). If disadvantaged students benefit disproportionately from taking Algebra II and other intensive courses, eliminating de facto tracking may be a key step in reducing disparities in educational attainment between low- and high-SES students and underrepresented minority and majority students.

Above, we employ a local average treatment effect (LATE) approach using an IV framework. As noted, these approaches are often an improvement over the naïve approach that does not account for nonrandom assignment (i.e., endogeneity) issues. Although the IV approach is popular, it is not without its critics, some of whom believe it is somewhat a theoretical relative to other approaches. For example, structural models (as defined by economists at least) focus more on the description of a theoretical model of the process and mechanisms underlying the problem at hand and attempt to estimate the fundamental parameters of interest. As Heckman notes, “the problem that plagues the IV approach is that the questions it answers are usually defined as probability limits of estimators and not by well formulated economic problems. Unspecified ‘effects’ replace clearly defined economic parameters as the objects of empirical interest” (Heckman & Urzua, 2009, p. 3). Heckman and associates (Heckman & Vytlacil, 2005; Carneiro, Heckman, & Vytlacil, 2011) have bridged the IV and structural model literature using a local version of IV (which they dub local instrumental variables or LIV) which can be used to derive the effects estimable using standard IV methods (average treatment effects, average treatment on the treated, LATE) plus it allows for the estimation of a highly relevant policy effect which they call the marginal policy relevant treatment effect (MP RTE). This approach is designed to remedy some of the deficiencies of the standard IV approach, in particular problems when the instruments are not tightly linked to policy changes of interest, in which case IV estimates do “not answer well-posed policy questions” (Carneiro et al., 2011, p.2779). This approach seems to hold great promise in allowing researchers to identify and estimate the effects of policies on educational (and other) outcomes and in so doing allows us to inform policymakers so they can make better informed decisions.

Concerned scholars are becoming increasingly vocal about the need for higher education research to address selection bias and use statistical methods that allow for stronger causal inferences (Goldrick-Rab, Carter, & Wagner, 2007; Long, 2007; McCall & Bielby, 2012; Reynolds & DesJardins, 2009). This study helps address their concerns by providing researchers with a tool—instrumental variables estimation—for examining how an endogenous explanatory variable causally affects an outcome. We hope this example illustrates how important it is to employ statistical methods that account for nonrandom assignment into “treatments” in observational data, whether these treatments take the form of a course, scholarship, tutoring program,

or any other intervention that may *potentially* facilitate educational attainment. Frankly, in many circumstances, the traditional “naïve” approach to studying educational policies, processes, and programs that are characterized by nonrandom assignment is often not rigorous enough. Higher education and institutional researchers need to become adept in using the latest tools that will allow us to make causal statements about what works in education and what needs to be improved. Hopefully, this chapter will be a valuable addition to the expanding literature in this area.

Acknowledgements The authors would like to thank Brian McCall and Stephen Porter for their helpful suggestions and feedback. All errors and omissions are, however, our own.

Appendix: Stata syntax

```
/*This file will run all analysis for the IV chapter on the
ELS data. The file for the NELS data is nearly identical,
simply replacing the dependent variable in each model
from persistence to bachelor's degree attainment*/

/*First create global macros for the models. This allows
us to insert a large number of variables into our models
without having to repeatedly type the variable names.*/

/**Becausedata used for this analysis are restricted,
we will not include actual variable names, but instead
will provide alternate names for the variables used***/

/*Exogenous independent variables*/
global exogl "mathquart2 mathquart3 mathquart4 male black
asian_amhisp_amnative_ammixedoth ses_q2 ses_q3 ses_q4 mom_
hs mom_att2yr mom_aa mom_att4yr mom_bamom_mamom_phd born_84
born_85 born_86 born_87 unemploy_rate2004 i.hsstate"

/*Endogenous independent variable*/
global endogl "algebra_2"

/*Instrumental variables*/
global instl "unemploy_rate2001 age_16_urate age_16"

/*BIVARIATE CORRELATIONS AMONG ALL VARIABLES. Here we
examine the bivariate relationships between each of our
variables*/
corpse_att algebra_2 unemploy_rate2001 age_16_urate
age_16 mathquart2 mathquart3 mathquart4 male black asian_
amhisp_amnative_ammixedoth ses_q2 ses_q3 ses_q4 mom_hs
mom_att2yr mom_aa mom_att4yr mom_bamom_mamom_phd
unemploy_rate2004
```



```

spearmanpse_att algebra_2 unemploy_rate2001 age_16_urate
age_16 mathquart2 mathquart3 mathquart4 male black asian_
amhisp_amnative_ammixedoth ses_q2 ses_q3 ses_q4 mom_hs
mom_att2yr mom_aa mom_att4yr mom_bamom_mamom_phd
unemploy_rate2004

/*Multivariate models of first to second-year
persistence*/

/**BASELINE OR NAIVE MODEL**/
/*Linear Probability Model (LPM)*/
reg persist $endol $exogl, robust

/*We use the 'eststo' command to save the estimates from
each of our final modelswhich we use later to create a
publication-ready table*/
eststo OLSpersist

/**INSTRUMENTAL VARIABLES ESTIMATORS**/

*Two Stage Least Squares (2SLS)

/*First we estimate the model, using the global macros
from above*/
ivregress 2sls persist $exogl ($endol = $inst1),
vce(robust)

/*Here we examine the model fit statistics from the first
stage model in the 2SLS approach. The 'estatfirststage'
command provides R-squared and Adjusted R-squared sta-
tistics along with partial R-squared statistics for and
F tests with significance levels for each endogenous
variable*/
estat firststage

/*Here we examine the overidentification tests to evaluate
the exclusion restriction for our instruments. To confirm
our expectation that the variables are properly excluded
from the second stage model. If that is the case these
test statistics will not be statistically significant*/
estat overid

/*Next we examine tests of the endogeneity of our Algebra
II variable. If our variable of interest is in facten-
dogenous, then these statistics will be statistically
significant*/
estat endogenous

/*Here we store the estimates from the 2SLS model to be
used to create a publication-ready table which will also

```

```

allow us to compare results across the estimated
models.*/
eststo SLSpersist

*Limited Information Maximum Likelihood (LIML)
/*Estimating the model*/
ivregressliml persist $exog1 ($endol = $instl), vce(robust)

/*Evaluating the first stage model statistics*/
estatfirststage
/*Overidentification tests*/
estat overid

/*Storing estimates*/
eststo LIMLpersist

*Generalized Method of Moments (GMM)
/*Running the model*/
ivregressgmm persist $exog1 ($endol = $instl), vce(robust)

/*Againexamine the first stage statistics*/
estat firststage

/*Overidentification tests*/
estat overid

/*Tests for endogeneity*/
estat endogenous

/*Storing Estimates*/
eststo GMMpersist

/*Control function with LPM and Bootstrap*/
/*In order to bootstrap the standard errors for these
estimates, we need to first write a program that will run
the first stage regression, save the residuals, and then
include those residuals as controls in the second stage
regression */
capture program drop lpmcf
program lpmcf
    quietly {
        /*estimate the first stage LPM*/
        reg algebra_2 $exog1 $instl, robust
        /*just in case we already saved these vari-
        ables we drop them*/
        capture drop alg2_resid_els
        /*store the residuals from the first stage
        */
        predict alg2_resid_els, resid
    }

```

```

        /*estimate the second stage LPM*/
        reg persist $endol $exogl alg2_resid_els,
        robust
    }
end

/*Now we estimate a control function model with an LPM
second stage on 250 bootstrapped samples and estimate
our standard errors from that*/
bootstrap _b, seed(1) r(250): lpmcf

/*Store the estimates*/
eststo CFLPMpersist

*Control function with Logit and Bootstrap
/*This program estimates the first and second stages then
we conduct a bootstrap to estimate the proper standard
errors*/
capture program drop logitcf
program logitcf
    quietly{
        /*estimate the first stage*/
        reg algebra_2 $exogl $inst1, robust
        capture drop alg2_resid_els_logit
        /*store residuals from first stage*/
        predict alg2_resid_els_logit, resid
        /*estimate the second stage logit*/
        logit persist $endol $exogl alg2_resid_
        els_logit, vce(robust)
    }
end

/*Now we estimate a control function model with a logit
second stage on 250 bootstrapped samples and produce
standard errors from that process*/
bootstrap _b, seed(1) r(250): logitcf

/*Because the coefficients produced through Stata's logit
routine are not directly comparable to those from each
of the other models that are linear probability models
in the second stage, we use Stata's 'margins' command to
convertlogit coefficients into comparable marginal
effects*/
margins, dydx(*)

/*Store the results*/
eststo CFLogitpersist

```

```
/*Finally we employ the 'esttab' routine to create a
publication-ready table of marginal effects (b) and
significance measures (p)*/
esttabOLSpersistSLSpersistLIMLpersistGMMpersistC-
FLMPersistCFLogitpersist, b(3) p(3) not wide plain
```

References

- Abdulkadiroglu, A., Angrist, J., Dynarski, S., Kane, T., & Pathak, P. (2011). Accountability and flexibility in public schools: Evidence from Boston's charters and pilots. *Quarterly Journal of Economics*, 126(2), 699–748.
- Achieve. (2011). *Closing the expectations gap: An annual 50-state report on the alignment of high school policies with the demands of college and careers*. Retrieved from <http://www.achieve.org/ClosingtheExpectationsGap2011>
- Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment*. Washington, DC: U.S. Department of Education.
- Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college*. Washington, DC: U.S. Department of Education.
- Alexander, K. L., Riordan, C., Fennessey, J., & Pallas, A. M. (1982). Social background, academic resources, and college graduation: Recent evidence from the National Longitudinal Survey. *American Journal of Education*, 90, 315–333.
- Altonji, J. G. (1995). The effects of high school curriculum on education and labor market outcomes. *Journal of Human Resources*, 30(3), 409–438.
- Angrist, J. D., Imbens, G. W., & Rubin, D. B. (1996). Identification of causal effects using instrumental variables. *Journal of the American Statistical Association*, 91(434), 444–455.
- Angrist, J. D., & Krueger, A. B. (1991). Does compulsory school attendance affect schooling and earnings? *Quarterly Journal of Economics*, 106(4), 979–1014.
- Angrist, J. D., & Krueger, A. B. (2001). Instrumental variables and the search for identification: From supply and demand to natural experiments. *Journal of Economic Perspectives*, 15(4), 69–85.
- Angrist, J. D., & Pischke, J. S. (2009). *Mostly harmless econometrics*. Princeton: Princeton University Press.
- Astin, A. W., & Oseguera, L. (2005). Pre-college and institutional influences on degree attainment. In A. Seidman (Ed.), *College student retention* (pp. 245–276). Westport, CT: American Council on Education.
- Attewell, P., & Domina, T. (2008). Raising the bar: Curricular intensity and academic performance. *Educational Evaluation and Policy Analysis*, 30(1), 51–71.
- Baum, C. F., Schaffer, M. E., & Stillman, S. (2003). Instrumental variables and GMM: Estimation and testing. *The Stata Journal*, 3(1), 1–31.
- Bean, J. P. (1980). Dropouts and turnover: The synthesis and test of a causal model of student attrition. *Research in Higher Education*, 12(2), 155–187.
- Bettinger, E.P., & Baker, R. (2011). *The effects of student coaching in college: An evaluation of a randomized experiment in student mentoring* (NBER Working Paper No. 16881). Retrieved from <http://www.nber.org.proxy.lib.umich.edu/papers/w16881>
- Bishop, J. H., & Mane, F. (2004). *Educational reform and disadvantaged students: Are they better off or worse off?* (CAHRS Working Paper #04-13). Ithaca, NY: Cornell University, School of Industrial and Labor Relations, Center for Advanced Human Resource Studies. Retrieved from <http://digitalcommons.ilr.cornell.edu/cahrswp/17>
- Bishop, J. H., & Mane, F. (2005). Raising academic standards and vocational concentrators: Are they better off or worse off? *Education Economics*, 13(2), 171–187.

- Bozick, R., & Ingels, S. J. (2008). *Mathematics course taking and achievement at the end of high school: Evidence from the Education Longitudinal Study of 2002 (ELS: 2002)* (NCES 2008-319). Washington, DC: U.S. Department of Education.
- Burkam, D. T., & Lee, V. E. (2003). *Mathematics, foreign language, and science course taking and the NELS:88 transcript data* (NCES 2003-01). Washington, DC: U.S. Department of Education.
- Camara, W., & Echternacht, G. (2000). *The SAT I and high school grades: Utility in predicting success in college* (RN-10). Retrieved from The College Board Office of Research and Development: http://professionals.collegeboard.com/profdownload/pdf/rn10_10755.pdf
- Cameron, C. A., & Trivedi, P. K. (2005). *Microeconometrics: Methods and applications*. New York: Cambridge University Press.
- Card, D. (1995). Using geographic variation in college proximity to estimate the return to schooling. In L. Christofides, E. Grant, & R. Swidinsky (Eds.), *Aspects of labour market behaviour: Essays in honour of John Vanderkamp* (pp. 201–222). Toronto: University of Toronto Press.
- Card, D. (2001). Estimating the return to schooling: Progress on some persistent econometric problems. *Econometrica*, 69(5), 1127–1160.
- Carneiro, P., Heckman, J. J., & Vytlacil, E. J. (2011). Estimating marginal returns to education. *American Economic Review*, 101(6), 2754–2781.
- Cellini, S. R. (2008). Causal inference and omitted variable bias in financial aid research: Assessing solutions. *The Review of Higher Education*, 31(3), 329–354.
- Choy, S. P. (2001). *Students whose parents did not go to college: Postsecondary access, persistence, and attainment*. Washington, DC: U.S. Department of Education.
- Cornwell, C., Lee, K., & Mustard, D. (2005). Student responses to merit scholarship retention rules. *Journal of Human Resources*, 40(4), 895–917.
- Cornwell, C., Lee, K., & Mustard, D. (2006). *The effects of state-sponsored merit scholarships on course selection and major choice in college* (IZA Discussion Paper No. 1953). Retrieved from <ftp://ftp.iza.org/dps/dp1953.pdf>
- Crosnoe, R. (2009). Low-income students and the socioeconomic composition of public high schools. *American Sociological Review*, 74(5), 709–730.
- Dalton, B., Ingels, S. J., Downing, J., & Bozick, R. (2007). *Advanced mathematics and science course taking in the spring high school senior classes of 1982, 1992, and 2004. Statistical analysis report* (NCES 2007-312). Washington, DC: U.S. Department of Education.
- Deke, J., & Haimson, J. (2006). *Valuing student competencies: Which ones predict postsecondary educational attainment and earnings, and for whom?* Princeton, NJ: Mathematica Policy Research, Inc.
- Dynarski, S., Hyman, J. M., & Schanzenbach, D. W. (2011). *Experimental evidence on the effect of childhood investments on postsecondary attainment and degree completion* (Working paper). Ann Arbor, MI: University of Michigan.
- Ehrenberg, R. G., & Marcus, A. J. (1982). Minimum wages and teenagers' enrollment-employment outcomes: A multinomial logit model. *Journal of Human Resources*, 17(1), 39–58.
- Fletcher, J., & Zirkle, C. (2009). The relationship of high school curriculum tracks to degree attainment and occupational earnings. *Career and Technical Education Research*, 34(2), 81–102.
- Frank, K. A., Muller, C., Schiller, K. S., Riegle-Crumb, C., Mueller, A. S., Crosnoe, R., & Pearson, J. (2008). The social dynamics of mathematics course taking in high school. *The American Journal of Sociology*, 113(6), 1645–1696.
- Gamoran, A. (1987). The stratification of high school learning opportunities. *Sociology of Education*, 60(3), 135–155.
- Geiser, S., & Santelices, V. (2004). *The role of advanced placement and honors courses in college admissions*. Berkeley, CA: Center for Studies in Higher Education, University of California. Retrieved from <http://cshe.berkeley.edu/publications/docs/ROP.Geiser.4.04.pdf#search=%22Saul%20Geiser%22>
- Goldrick-Rab, S., Carter, D. F., & Wagner, R. W. (2007). What higher education has to say about the transition to college. *Teachers College Record*, 109(10), 2444–2481.

- Goodman, J. (2008). Who merits financial aid? Massachusetts' Adams scholarship. *Journal of Public Economics*, 92(10–11), 2121–2131.
- Greene, W. H. (2011). *Econometric analysis* (7th ed.). Upper Saddle River, NJ: Prentice Hall.
- Hall, A. R., Rudebusch, G., & Wilcox, D. (1996). Judging instrument relevance in instrumental variables estimation. *International Economic Review*, 37, 283–298.
- Hallinan, M. T. (1994). Tracking: From theory to practice. *Sociology of Education*, 67(2), 79–84.
- Heckman, J., & Vytlačil, E. (2005). Structural equations, treatment effects, and econometric policy evaluation. *Econometrica*, 73, 669–738.
- Heckman, J. J., & Urzua, S. (2009). *Comparing IV with structural models: What simple IV can and cannot identify* (NBER Working Paper 14706). Retrieved from <http://www.nber.org/papers/w14706>
- Holland, P. W. (1986). Statistics and causal inference. *Journal of the American Statistical Association*, 81, 945–970.
- Horn, L., & Kojaku, L. (2001). *High school academic curriculum and the persistence path through college. Statistical analysis report* (NCES 2001-163). Washington, DC: U.S. Department of Education.
- Kane, T. J., & Rouse, C. (1993). *Labor market returns to two- and four-year colleges: Is a credit a credit, and do degrees matter?* (NBER Working Paper #4268). Retrieved from <http://en.scientificcommons.org/37629075>
- Kelly, S. (2009). The Black-White gap in mathematics course taking. *Sociology of Education*, 82(1), 47–69.
- Kim, J., Kim, J., DesJardins, S., & McCall, B. (2012, April). *Exploring the relationship between high school math course-taking and college access and success. Paper presented at the meeting of the American Educational Research Association*, Vancouver, Canada.
- Klopfenstein, K., & Thomas, M. K. (2009). The link between advanced placement experience and early college success. *Southern Economic Journal*, 75(3), 873.
- Lee, V. E., Chow-Hoy, T. K., Burkam, D. T., Gevert, D., & Smerdon, B. A. (1998). Sector differences in high school course taking: A private school or Catholic school effect? *Sociology of Education*, 71(4), 314–335.
- Lemieux, T., & Card, D. (1998). *Education, earnings, and the “Canadian GI Bill”* (NBER Working Paper #6718). Retrieved from <http://faculty.arts.ubc.ca/tlemieux/papers/w6718.pdf>
- Levine, P. B., & Zimmerman, D. J. (1995). The benefit of additional high school math and science classes for young women: Evidence from longitudinal data. *Journal of Business and Economics Statistics*, 13(2), 137–149.
- Long, L. H. (1972). The influence of number and ages of children on residential mobility. *Demography*, 9(3), 371–382.
- Long, B. T. (2007). The contributions of economics to the study of college access and success. *Teachers College Record*, 109(10), 2367–2443.
- Long, M. C., Iatarola, P., & Conger, D. (2009). Explaining gaps in readiness for college-level math: The role of high school courses. *Education Finance and Policy*, 4(1), 1–33.
- Ma, X. (2001). Participation in advanced mathematics: Do expectation and influence of students, peers, teachers, and parents matter? *Contemporary Educational Psychology*, 26(1), 132–146.
- McCall, B. P., & Bielby, R. M. (2012). Regression discontinuity design: Recent developments and a guide to practice for researchers in higher education. In J. Smart & M. Paulsen (Eds.), *Higher education: Handbook of theory and research* (Vol. 27, pp. 249–290). Dordrecht, The Netherlands: Springer.
- Michigan Department of Education. (2006). *Preparing Michigan students for work and college success*. Retrieved from <http://www.michigan.gov/mde/0,4615,7-140-37818---S,00.html>
- Murnane, R. J., & Willett, J. B. (2011). *Methods matter: Improving causal inference in educational and social science research*. New York: Oxford University Press.
- Murray, M. P. (2006). Avoiding invalid instruments and coping with weak instruments. *Journal of Economic Perspectives*, 20(4), 111–132.
- National Commission on Excellence in Education. (1983). A nation at risk: The imperative for educational reform. *The Elementary School Journal*, 84(2), 113–130.

- Neumark, D., & Wascher, W. (1995). Minimum wage effects on employment and school enrollment. *Journal of Business & Economic Statistics*, 13(2), 199–206.
- Newhouse, J., & McClellan, M. (1998). Econometrics in outcomes research: The use of instrumental variables. *Annual Review of Public Health*, 19, 17–34.
- Oakes, J., & Guiton, G. (1995). Matchmaking: The dynamics of high school tracking decisions. *American Educational Research Journal*, 32(1), 3–33.
- Pallas, A. M., & Alexander, K. L. (1983). Sex differences in quantitative SAT performance: New evidence on the differential coursework hypothesis. *American Educational Research Journal*, 20(2), 165–182.
- Pike, G. R., Hansen, M. J., & Lin, C. H. (2011). Using instrumental variables to account for selection effects in research on first-year programs. *Research in Higher Education*, 52, 194–214.
- Planty, M., Provasnik, S., & Daniel, B. (2007). *High school course taking: Findings from the Condition of Education, 2007* (NCES 2007–065). Washington, DC: U.S. Department of Education.
- Porter, S. R. (2012). *Using instrumental variables properly to account for selection effects*. Unpublished manuscript. Retrieved from http://www.stephenporter.org/papers/Pike_IV.pdf
- Rech, J. F., & Harrington, J. (2000). Algebra as a gatekeeper: A descriptive study at an urban university. *Journal of African American Studies*, 4(4), 63–71.
- Reynolds, C. L., & DesJardins, S. L. (2009). The use of matching methods in higher education research: Answering whether attendance at a 2-year institution results in differences in educational attainment. In J. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 24, pp. 47–97). Dordrecht, The Netherlands: Springer.
- Rose, H., & Betts, J. R. (2001). *Math matters: The links between high school curriculum, college graduation, and earnings*. San Francisco: Public Policy Institute of California.
- Rose, H., & Betts, J. R. (2004). The effect of high school courses on earnings. *The Review of Economics and Statistics*, 86(2), 497–513.
- Rothenberg, T. J. (1983). Asymptotic properties of some instruments in structural models. In S. Karlin, T. Amemiya, & L. A. Goodman (Eds.), *Studies in econometrics, time series, and multivariate Statistics*. New York: Academic.
- Rubin, D. (1974). Estimating causal effects of treatments in randomized and non-randomized studies. *Journal of Educational Psychology*, 66, 688–701.
- Sadler, P. M., & Tai, R. H. (2007). The two high-school pillars supporting college science. *Science*, 317(5837), 457–458.
- Schneider, B., Swanson, C. B., & Riegle-Crumb, C. (1998). Opportunities for learning: Course sequences and positional advantages. *Social Psychology of Education*, 2, 25–53.
- Sells, L. W. (1973). High school mathematics as the critical filter in the job market. In R. T. Thomas (Ed.), *Developing opportunities for minorities in graduate education* (pp. 37–39). Berkeley, CA: University of California Press.
- Simpkins, S., Davis-Kean, P. E., & Eccles, J. S. (2006). Math and science motivation: A longitudinal examination of the links between choices and beliefs. *Developmental Psychology*, 42, 70–83.
- Sovey, A. J., & Green, D. P. (2011). Instrumental variables estimation in political science: A readers' guide. *American Journal of Political Science*, 55(1), 188–200.
- Staiger, D., & Stock, J. (1997). Instrumental variables regression with weak instruments. *Econometrica*, 65, 557–586.
- StataCorp. (2009). *Stata: Release 11*. College Station, TX: StataCorpLp.
- Stock, J. H., Wright, J. H., & Yogo, M. (2002). A survey of weak instruments and weak identification in generalized method of moments. *Journal of Business & Economic Statistics*, 20, 518–529.
- Stock, J. H., & Yogo, M. (2005). Testing for weak instruments in linear IV regression. In D. W. K. Andrews & J. H. Stock (Eds.), *Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg* (pp. 80–108). New York: Cambridge University Press.
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research*, 45(1), 89–125.
- United States Department of Agriculture. (2004). *Rural education at a glance* (Rural Development Research Report No. 98). Retrieved from http://inpathways.net/rural_education.pdf

- United States Department of Education. (2008, December). *What Works Clearinghouse, Procedures and standards handbook, version 2*. Washington, DC: United States Department of Education.
- Useem, E. L. (1992). Middle schools and math groups: Parents' involvement in children's placement. *Sociology of Education*, 65(4), 263–279.
- Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. Cambridge, MA: The MIT Press.
- Yonezawa, S., Wells, A. S., & Serna, I. (2002). Choosing tracks: “Freedom of choice” in detracking schools. *American Educational Research Journal*, 39(1), 37–67.

Chapter 7

On the Meaning of Markets in Higher Education

William E. Becker and Robert K. Toutkoushian

Introduction

There is significant and growing interest around the globe in understanding and evaluating the way in which institutions of higher education (henceforth, IHE) are organized and compete with each other. Governments at national and state levels focus attention on encouraging citizens to acquire postsecondary degrees as a means to increase both the private benefits to individuals and the positive externalities that spill over to citizens within their domains (McMahon, 2009). Education is also seen by some nations as a means to foster economic growth and thus better enable them to compete with each other (Arimoto, 1997; Dill, 1997a; Marginson, 1997).

There are many different approaches that governments use for providing higher education services to consumers. Some nations (and states) have mature higher education systems that offer a substantial range of choices for students, whereas other nations/states have fewer options for students and force many of them to look outside their geographic boundaries for postsecondary education. In addition to differences in the number of suppliers in the industry, nations vary in terms of the types of institutions available to students. The United States in particular is known for its relatively wide breadth of postsecondary options for consumers, which include 2-year community colleges; 4-year baccalaureate institutions that range in size from several hundred to more than 50,000 students; institutions that focus significant

Please address all correspondence regarding this manuscript to Robert K. Toutkoushian.

W.E. Becker, Ph.D.

Department of Economics, Indiana University, Wylie Hall 105,
Bloomington, IN 47405, USA
e-mail: beckerw@indiana.edu

R.K. Toutkoushian, Ph.D. (✉)

Institute of Higher Education, University of Georgia, Meigs Hall 114,
Athens, GA 30602, USA
e-mail: rtoutkou@uga.edu

attention not only on instruction but also research; and institutions that specialize in engineering, liberal arts, and so on. In other nations, however, postsecondary industries tend to be more uniform but are quickly becoming more diverse as well.

Different philosophies have also been taken with regard to how a nation manages its higher education system. It was common in the past for nations to rely on a centralized management model in which the government made decisions regarding which students could receive a postsecondary education, how students were distributed among institutions, and which colleges and universities were permitted to operate (Jongbloed, 2003). However, increasingly, nations have moved toward decentralized management models where students are free to select whether and where to go for postsecondary education and training, and institutions are permitted to compete directly for students and other resources (Teixeira, Jongbloed, Amaral, & Dill, 2004; Williams, 1997). The hope is that through decentralization, the higher education sector will become more efficient in the production of higher education services and lead to subsequent gains in the standard of living.

In academic circles and higher education policy discussions, it is common to hear the word “market” used in conjunction with “higher education,” in varying and sometimes even negative contexts. Whereas some nations have encouraged institutions to more actively compete with each other in the hopes of the benefits that would accompany this shift, some academics have raised concerns with this movement. The notions of “commercialization” and “academic capitalism” (Bok, 2003; Leslie & Slaughter, 1997), for example, hold that due to reductions in relative government support for higher education, colleges and universities in the United States have been forced to deliberately engage in more activities that have the potential to raise revenues and that this shift is altering the nature of academe. Will pursuing profitable partnerships with corporations change the type of research and perhaps teaching that occurs on college campuses? Winston (1999, 2000, 2003) has further argued that there is an increasing stratification among postsecondary institutions as they seek to maximize their prestige through donative resources, leading to a “positional arms race” in academe. As institutions compete for the best students and the gap between the elite and other institutions increases, what will this mean for educational opportunities for students?

Confusion also exists in discussions on this topic due to the fact that, as noted by Leslie and Johnson (1974, p. 5), “...the term ‘market’ is not only complex but is also subject to varying interpretations and definitions.” A number of studies use “market” to represent the privatization of a nation’s higher education system and increased reliance on competition among suppliers to set prices and allocate students. To illustrate, Brunner (1997) uses the terms “market” and “system” interchangeably to refer to the lack of central direction of higher education by the Chilean national government. Similarly, Robert Reich, now a professor of social and economic policy at the University of California Berkeley and previously a labor secretary in President Clinton’s administration in the United States, opined that “Higher education in the United States is coming to resemble any other kind of personal service industry ... higher education products ... are sold on the market, there is a kind of marketisation that has set in” (Reich, 2004).

Although many economists have pointed to the potential efficiency gains that are thought to accompany increased reliance on the free market to make pricing and allocation decisions in product and labor markets, not all academics and policy-makers view this shift as a positive development. Dill and Soo (2004), for example, argue that “The worldwide adoption of market-based policies for higher education such as common degree frameworks...could foster an international ‘arms race’ among universities...” (p. 67). As another example, Massy (2004) wrote of the higher education market in the United States as an allocation system in which the government was not in charge and decentralized decision making on both the demand and supply side results in less than satisfactory results because markets cannot discipline price without information on quality. Implicit in this statement is that there is a well-defined national market for higher education goods and services.

The phrase “market for higher education” has also been used at times to describe the broad collection of postsecondary providers within a nation or region. Studies in this area may focus attention on the number and types of colleges and universities that exist within a nation. The source of confusion here is that the set of higher education providers within a nation more properly represent the higher education industry or sector for a country, as opposed to a specific higher education market where a group of buyers (students) and sellers (institutions) come together to set prices and allocate services and where colleges compete with each other for customers. Due to reasons we will explain, it is likely the case that a nation’s higher education industry is comprised of a number of separate markets as opposed to only a single market.

There is considerable confusion as to whether, and how, colleges and universities compete in a market or markets. Which institutions, divisions within an institution, or individuals are included in a market? If there is not a single market in the higher education industry, then are there well-defined submarkets, and if so how should they be identified? The approach used by economists to examine the market for any good or service relies on specific attributes of the potential suppliers of the good/service and their customers. A higher education market represents a group of institutions for which the breaks in the chain of substitution are relatively clear between the institutions, but where the product or service is still sufficiently similar (in terms of function, appearance, quality, and the like) to not require classifying these providers into different markets. In antitrust hearings and legal proceedings, as well as in individual institution’s advertising and promotion efforts, the definition of a market and who participates in that market (either as rivals, potential rivals, input suppliers or buyers) is critical (see, e.g., Scheffman & Spiller, 1987).

In contrast to antitrust issues that require well-defined markets, consider the comments made by Charles Miller, the chairman of the US Commission on the Future of Higher Education, in “Colloquy,” *The Chronicle of Higher Education’s* online forum (Selingo, 2006). Miller was interviewed about his Commission’s final report, which urged that the US higher education system be overhauled, including making universities more innovative and more accountable to the public. In this interview, Miller was reminded that he had said “we do not actually have a market system in higher education” and was asked what he would call the competition between different universities for students. He acknowledged the existence of this

competition but continued to say, “however I think competition does not automatically make a market system.” Although competition between amateur tennis players does not make a market, competition between like universities (suppliers of similar products and services, for a price) for students (demanders of the products and services, at a price) does. Whether students pay the full cost of production or have some portion of cost paid for by others is irrelevant to the existence of a market. Competition between the sellers of close substitute goods or services takes place in a market. A market may thus be thought of as a group of firms that are in close competition with each other. The two concepts are, in fact, inextricably linked when it comes to exchange.

It has also been suggested that there is too little competition in higher education markets due to the high market power held by a small number of prestigious institutions (Epple, Romano, & Sieg, 2006; Leslie & Johnson, 1974). Perhaps the best illustration of this view is the 1991 antitrust case that was brought against Massachusetts Institute of Technology (MIT) and the eight Ivy League institutions in the United States for collusive behavior. The US Justice Department accused MIT and the Ivy League institutions of price fixing in the allocation of financial aid and setting of tuition. The schools argued that their cooperative behavior was aimed at helping needy students with financial aid and did not affect price. Nevertheless, all but MIT signed a consent decree agreeing to stop the cooperative behavior. In the 1992 trial, *USA v. Brown University, et al.*, 805 F. Sup. 288 (E.D.Pa. 1992), MIT was found guilty of price fixing. Following this conviction, the US Congress passed the Higher Education Act of 1992 that enabled schools to cooperate in the assignment of need-based aid. In 1993, the Third Circuit overturned the MIT guilty verdict, *USA v. Brown University, et al.*, 9 F.3d 658 (3rd Cir. 1993), and the government dropped all inquiries into the matter of cooperation among “the overlap” schools in assigning need-based aid. As reported in Bamberger and Carlton (1999) and Carlton, Bamberger and Epstein (1995), Carlton gave expert testimony that the schools’ cooperation did not raise prices, concluding that there were no grounds for the application of antitrust against these nonprofits in the absence of adverse price and output effects. Subsequently, Netz (1999) “found that a need-only financial aid policy significantly increases the price paid (tuition) by non-needy students; increases the average price paid by students who receive financial aid; and substantially increases earnings from tuition.” Readers are also referred to Salop and White (1991) and Carlson and Shepherd (1992) for more discussion of this case.

Concerns about collusive behavior in academic markets still persist nearly twenty years after the MIT case. Miller went on to say that it was “possible to argue that among certain sets of institutions we have the equivalent of an oligopoly, where there may be competition within a group of institutions, but that set of institutions has powerful advantages over other sets of institutions” (Selingo, 2006). Miller acknowledged in his comments, perhaps unwittingly, that many distinct markets do exist in higher education and that it is entirely feasible that different groups of institutions can be delineated into economically meaningful and separate markets. But he then argued that higher education is heavily subsidized and regulated, lacks transparency, and that no penalties are incurred for poor performance; therefore,

“it would be difficult to describe this as a market system.” Miller’s range of comments demonstrates the perils of failure to understand the characteristics of markets as used by economists. Informed public policy debate is not enhanced, for example, by confusing the term “market system,” which describes the way a nation’s economy is organized (capitalist, socialist, etc.), with the term “market,” which describes a much narrower grouping of institutions into clusters of close competitors.

If antitrust legislation and the efforts of public policymakers to regulate or influence higher education institutions were not sufficient reasons to look at markets, the possibility of a connection between pricing and competition could provide a compelling reason for campus policymakers to refine their understandings of the extent to which markets exist among colleges and universities. Hoxby (1997), for example, found that increased competition between IHE from 1940 to 1991 explained real tuition increases of approximately 50% for selective private colleges in the United States. Outside of the USA, the British government has significantly cut funding to universities, with yet another new fee structure scheduled for the 2012 class, further shifting the funding burden from the state to the student, with increased competition for those students not just in the United Kingdom but within the European Union and the rest of the world. As Great Britain and the rest of Europe move more and more toward a market-driven postsecondary system through the Bologna Process, institutional managers and politicians alike will learn that competition for students (being both consumers of and part of the education process) will drive up cost and perhaps quality as well, if Hoxby’s results can be generalized.

At the same time, there is debate within the literature whether it is appropriate to even apply the notion of markets from the private sector to postsecondary institutions in the first place (Breneman, 1981; Leslie & Johnson, 1974; Winston, 1997). On the one hand, a number of researchers (Astin, 1993; Borden & Bottrill, 1994; Cave, Hanney, & Kogan, 1991; Toutkoushian & Danielson, 2002) have used the production analogy of firms to describe the operations of colleges and universities. It may also be argued, however, that colleges are so different from firms that the concept of markets is irrelevant for higher education.

It is important to properly define what is meant by “markets and higher education” in order to better inform policy analysis. If the intent of higher education policy is to alter the behavior of students and institutions in a specific market, then it is crucial that policymakers begin by defining which market they are trying to affect. There are instances where a policy, such as not allowing for-profit colleges to receive federal student aid, would clearly have effects on for-profit institutions and their students but have little or no effect on major research universities given that they compete in different markets for students. Or, if the State of Georgia changed the parameters of its HOPE Scholarship program, it is important for policymakers to know which institutions, in addition to the four-year public institutions in the state, would possibly be affected by the change. Would it also include out-of-state public institutions and private institutions within the State of Georgia? And if so, would it affect all private institutions or only certain private institutions?

In this chapter, we provide a review of the ways in which the concept of markets has been – and could be – applied to higher education.¹ We first summarize the ways

in which markets and higher education have been described by academics and policymakers in the sizable literature on this topic. Following this section, we provide an overview of the economist's textbook definition and perspective on markets as they apply to firms in the for-profit world. These ideas are then used to consider how economists would conceptualize the different markets that exist in higher education. We focus on the attributes of markets in higher education (specifically, how higher education services are priced and bundled for consumers) and then turn to a more detailed exploration of the various markets that exist within the higher education industry in the United States. We further examine how to identify the specific markets within higher education and the resulting implications for policymakers. Through this discussion, we will argue that a nation's higher education system should rightfully be thought of not as a single market, but rather a series of separate markets for students and resources, with segmented markets within these groups. Although much of our discussion will focus on the higher education industry in the United States, we also provide illustrations of how these concepts play out in the higher education industries in other nations as well.

Literature Review on Markets and Higher Education

Even a cursory perusal of the literature will reveal that there have been many books, journal articles, and commentaries published on the general topic of markets and higher education. Books such as *Universities in the Marketplace: The Commercialization of Higher Education* (Bok, 2003), *Markets in Higher Education: Rhetoric or Reality?* (Teixeira, Jongbloed, Dill, & Amaral, 2004), *Higher Education as Competitive Enterprise: When Markets Matter* (Zemsky, Shaman, & Schapiro, 2001), and *The Global Market for Higher Education* (Mazzarol & Soutar, 2001), combined with numerous articles in peer-reviewed journals on markets and higher education, give the impression that the topic of markets in higher education is well understood by academic education specialists and policymakers alike. As we argue in the Introduction, however, we believe that this is not the case.

The phenomenon of competition between colleges and universities in the United States can be traced back to the nineteenth century, when the nation began to seriously challenge the notion that higher education should be reserved for the elite in society and/or the religious indoctrination of citizens. With the passage of the Morrill Act of 1862, the United States greatly expanded the supply of publicly supported institutions that would alter the shape of the higher education industry by providing direct competition with private colleges and universities for students and resources. Nations around the world would later embrace the same concept through what is often referred to as the "massification of higher education" (Guri-Rosenblit, Šebková, & Teichler, 2007; Teichler, 1998; Yorke, 2003). The higher education industry in the United States would later experience additional increases in demand in the twentieth century due to the Servicemen's Readjustment Act of 1944 (commonly referred to as the G. I. Bill) and population shifts due to the baby boomer

generation. As the number of higher education suppliers increased, it led to more pressure for all institutions to attract students in sufficient numbers to fulfill their respective missions.

Academic discussions of the role of markets in higher education industries can be traced back at least to 1918, when the economist Thorstein Veblen produced a compelling critique on higher education in the United States in the early twentieth century in his book *The higher learning in America: A memorandum on the conduct of universities by business men*. Veblen (1918) observed that even at the turn of the twentieth century, colleges and universities were acting in ways similar to that of firms in competitive markets:

The fact that the universities are assumed to be irreconcilable competitors, both in the popular apprehension as evidenced by the maneuvers of their several directors, is too notorious to be denied... (1918, p. 89)

Even though Veblen acknowledged that IHE at the time competed for students and resources, he struggled to explain why competition in higher education was necessary. He attributed the competition to the “habits of thought” of businessmen, which he saw as an encroachment on the traditional domain of IHE. Interestingly, Veblen (1918) made a careful distinction between the “modern university” (where scholarly inquiry occurred) and “lower and professional schools” (where training of students occurred), which is similar to later descriptions of the bifurcation of our current sectors of the higher education industry into 2- and 4-year institutions.

Since the publication of Veblen’s book, a number of academics have agreed with his observation that to some degree, colleges and universities do, in fact, compete with each other. Outside of the United States, there have also been studies that have examined the presence of competition between colleges and universities in many nations including Australia (Marginson, 1997; Meek & Wood, 1997), Great Britain (Gibbs, 2001; Glennerster, 1991; Williams, 1997), Spain (Mora, 1997), Japan (Arimoto, 1997; Yonezawa, 1998), Korea (Kim & Lee, 2006), the Netherlands (van Vught, 1997), Chile (Brunner, 1993), and Argentina (Rozada & Menendez, 2002). Glennerster (1991, p. 1273), for example, noted that “Selective institutions become the norm and competition between institutions to provide the best or most appropriate courses has always been a feature of higher and further education...Such is the case for treating post school education as any market commodity.”

Academics have observed that colleges are universities compete with each other in a number of ways. Not only do postsecondary institutions try to obtain the best and brightest students, but they also must compete for other resources, including faculty, research funding, state support, and private donations. The prestige of an institution is affected not only by the academic quality of the students enrolled but also the faculty members employed (Dill, 1997b; Jongbloed, 2003; Leslie & Slaughter, 1997). Brewer, Gates and Goldman (2002) argued that IHE compete in four different revenue markets: student enrollments, research funding, public fiscal support (i.e., state and federal appropriations), and private giving. Depending on the market structure, it could be the case that an institution competes with one set of institutions in the market for students and with another set of institutions in the market for faculty.

The notion of competitive markets and colleges adopting businesslike behavior has not been embraced by all as a positive development for higher education. Some have argued that postsecondary institutions enjoy considerable market power and use this power to affect how they set prices for students (Carlton et al., 1995; Epple et al., 2006; Geiger, 2004; Leslie & Johnson, 1974; Leslie & Slaughter, 1997). Massy's (1989) model of higher education, for example, implicitly assumes that each institution is a separate monopoly that can raise prices at will to cover costs without ramifications. Even if higher education markets could be construed as having some degree of competition, concern would exist that if there is not a sufficient amount of competition, colleges may be able to collude to set prices as evidenced in the MIT case previously discussed.

Others have argued that the notion of truly free markets does not apply to higher education in that even in higher education markets that are competitive, governments usually provide some level of intervention and oversight (Dill, 1997b; Glennerster, 1991; Jongbloed, 2003). Jongbloed (p. 111), for example, observed that "...in reality a true market for higher education does not exist in many countries. This is because government policies effectively prevent such a market from forming." This description certainly applies to the higher education industry in the United States, where individual states often explicitly control the number of public institutions in the market, the degrees they can offer, and the prices they can charge. Some have used the phrase "quasi-markets" to describe a higher education industry when there is some freedom among suppliers, but governments are not totally divorced from the operations of the market (Glennerster, 1991; Marginson, 1997; Massy, 2004; Teixeira, Jongbloed, et al., 2004; Williams, 1997).

The shift toward applying free market principles to higher education has raised concerns that there could be negative ramifications for the nature of higher education services. Gibbs (2001), for example, argues that market mechanisms may be problematic in higher education if they lead IHE to emphasize degree production over encouraging critical thinking and other skills that are more difficult to quantify. Similarly, the work of Slaughter and Leslie (1997), Rhoades and Slaughter (1997, 2004), Slaughter and Rhoades (2009), Bok (2003), Glenna, Lacy, Welsh and Biscotti (2007), and others holds that as colleges and universities increasingly pursue extramural funding and partnerships with industry in the name of competition, it may divert attention away from more traditional academic inquiry. Pugsley (2004) has opined that the adoption of free market principles by higher education has led to discrimination against various groups of students, and others have gone so far as to decry the "McDonaldization of higher education" (Hayes & Wynyard, 2002; Ritzer, 1998). Even most critics, however, would certainly acknowledge that some degree of competition exists between colleges and universities across the globe.

The concept of the market has been used in a variety of ways throughout the literature. The ambiguity in how the term "market" is defined and used in these studies contributes to the confusion surrounding this topic. Based on our review, it appears as though these studies of markets and higher education can be generally grouped into one of three categories: (1) studies that examine the trend toward deregulation of higher education industries by nations, (2) studies that seek to describe the structure

of higher education industry within a specific region (typically a nation), and (3) studies that analyze the ways in which institutions compete with each other. We will examine each of these in turn.

Deregulation of Higher Education Industries

The largest segment of the literature on markets and higher education focuses on the global trend toward reducing the role of government in making decisions about who should go to college, where they should go to college, and how decisions about college pricing and supply are made. Studies in this line of inquiry include Glennerster (1991), Jongbloed (2003), Dill (1997a, 1997b), Brunner (1997), Meek and Wood (1997), Williams (1997), and many others. To these authors, the term “market” refers to the notion of allowing the free (competitive) market to set prices and output and allocate the supply of students across institutions.

The introduction of competitive markets into higher education has been driven by a number of factors. Going back to Adam Smith’s seminar book *The Wealth of Nations* (1776), and more contemporary economists including F. A. Hayek’s *The Road to Serfdom* (1944), *The Fatal Conceit: The Errors of Socialism* (1988), Milton Friedman’s *Capitalism and Freedom* (1962), and many others, the field of economics has a long tradition of advocating in favor of competitive markets as a means to achieve the efficient allocation of resources. The fact that the United States, with its capitalist economic system and competitive higher education industry, saw substantial economic growth in the twenty-first century certainly provided an incentive for other nations to try and replicate its approach to reap similar benefits.

Milton Friedman (1955, 1962) in particular has had a profound influence on the use of competitive markets, rather than governments, to organize and operate markets within education in the United States. The deregulation movement in higher education outside of the United States has coincided with the political changes that occurred in much of eastern Europe in the early 1990s (Williams, 1997; Friedman, 2005). Thomas Friedman in *The World Is Flat: A Brief History of the Twenty-First Century* (2005) observed that world economic systems have become more interconnected in recent years, which has led to increased competition among nations. As nations across the globe adopted capitalistic economic systems, it was natural to conclude that their educational systems could likewise benefit from becoming more competitive.

The decentralization of higher education and decline in the share of costs covered by state governments have led to greater competition among IHE for other sources of revenue. The concepts of “academic capitalism” (Rhoades & Slaughter, 1997, 2004; Slaughter & Leslie, 1997; Slaughter & Rhoades, 2009) and “commercialization of higher education” (Bok, 2003) refer to how colleges have increasingly sought out new partnerships with industry and opportunities to secure revenues from students and state governments. The concern expressed with this phenomenon is that by focusing more attention on revenue generation, IHE may be changing the nature

of what they do in ways that go against the pure pursuit of knowledge. Slaughter and Leslie (1997) argued that between 1970 and 1995, national policy in Australia, Canada, the United Kingdom, and the United States promoted a shift in higher education from basic curiosity-driven inquiry to the formation of academic capitalism, in which the pursuit of external moneys was the driving force. The emergence of academic capitalism is traced to “the growth of global markets, the development of national policies that target faculty-applied research, the decline of the block grant as a vehicle for state support for higher education, and the accompanying increase in faculty engagement with the market” (p. 11). Slaughter and Leslie, and more recently Rhoades and Slaughter (2004), do not differentiate between capitalism (which is usually associated with private ownership of resources and entrepreneurship) and markets as defined by Marshall (1920) nearly 100 years ago.

Descriptions of Higher Education Industries

Other studies have attempted to explain how institutions within a nation’s higher education system can be categorized. It is recognized in these works that not all colleges are the same with regard to ownership (public versus private), profit status, level of educational degree offered, and involvement in producing research. It is important to note, however, that groupings of institutions by these types of characteristics do not coincide with what economists would describe as a market where a set of institutions directly compete with each other for students and resources.

Among the earliest efforts to develop meaningful groupings of institutions within the higher education industry in the United States was the classification scheme created by The Carnegie Commission on Higher Education [CCHE] (1973). The Carnegie Commission developed its first set of categories based on the level of highest degree offered, amount of federal funding received for sponsored research, and the number of degrees awarded by level. This resulted in groupings of institutions such as “Research I,” “Research II,” “Doctoral I,” and so on. Of particular concern to the Carnegie Commission is that some institutions began to view the categories as having normative value with more research-oriented categories considered more prestigious than teaching-oriented categories. Some colleges increasingly sought ways to move up in the Carnegie classifications from, say, a Doctoral I institution to a Research II institution, as part of the research drift occurring within the higher education industry (Dill & Soo, 2004; Massy, 2004). To reduce this strategic behavior by institutions, as well as provide a richer description of the types of institutions within the higher education industry, the Carnegie Commission has made several modifications to their classification scheme over the years. The 2010 classification scheme groups institutions according to their instructional programs, enrollment profiles, size, and settings.

There seems to be no shortage in the number of organizations that have developed their own categorizations of institutions of higher education in the United States. The American Association of University Professors (AAUP), for example,

groups institutions into categories based on highest degree offered and the number of degrees conferred. The College and University Personnel Association (CUPA) likewise has produced their own groups of colleges and universities based on public/private status, research intensity, and selected other criteria. *US News and World Report* ranks colleges and universities within a number of groupings, including whether an institution primarily competes for students on a national or regional basis. It is important to note that many of the institutions within the categories developed by these organizations do not directly compete with each other for the majority of students they enroll, and thus the groupings should not be viewed as markets within the higher education industry.

Finally, Zemsky et al. (2001) offered a different type of classification scheme that begins to connect categories of institutions to the concept of markets. They created a “seven segment market taxonomy” (also see Zemsky, Shaman, & Ianozzi, 1997) where institutions were grouped according to their selectivity, graduation rates, and enrollment patterns of students (national, regional, within state, and local). Although the taxonomy did not identify specific markets, it represented an important step toward recognizing how institutions compete with each other.

Competition in Higher Education Markets

One limitation with the aforementioned categorization schemes developed by various organizations is that they are largely atheoretical in that little justification is often given for the choice of criteria for grouping institutions. In contrast, some academics have focused on the reasons why institutions may differ from each other. Most notable in this strand of literature is the work by Gordon Winston. Winston (1999, 2000, 2003) argued that the uneven level of donative resources (subsidies) received by institutions has created a hierarchical stratification of colleges and universities. Institutions with high levels of donative resources are better able to compete for top students, which in turn enables them to raise their prestige. Despite the importance of Winston’s work for helping to better understand the nature of differences across institutions, the resulting hierarchy does not necessarily correspond with distinct markets for students and resources. For example, institutions within the same decile group of donative resources may have similar financial and pricing structures but may rarely compete for the same students if they are located in different geographic regions.

There have been several efforts to apply economic-like concepts of markets to higher education. The article “The market model and higher education” by Leslie and Johnson (1974) is one of the first in this strand of literature. Leslie and Johnson suggested that the higher education industry consists of a number of markets and that for a number of reasons, the perfectly competitive market structure does not apply to higher education markets. They further discussed economic concepts of markets such as the homogeneity of higher education services and barriers to entry and exit. Jongbloed (2003) described eight conditions for a market which in some

ways overlap the traditional criteria examined by economists. He also observed that "...there is not a single higher education market but rather a multitude of markets" (2003, p. 111) and argued that government involvement in higher education markets was an important constraint on the competitive actions of institutions. Other studies that have examined the structure of higher education markets include Breneman (1981), Dill and Sporn (1995), Dill (1997a), Rothschild and White (1993, 1995), and Epple et al. (2006).

Brewer et al. (2002) provide perhaps the most thorough examination to date of the ways in which postsecondary institutions in the United States compete with each other. The authors developed their own typology of postsecondary institutions based on the extent to which institutions can be grouped according to their primary strategy in higher education markets. In their framework, reputation and prestige are "assets that allow institutions of higher education to convey nonprice information to customers" (2001, p. 27). Unlike other writers who often use these terms interchangeably, Brewer et al. asserted that there is an important distinction between an institution's reputation and prestige that affects how it competes for students and resources. The authors used the term "reputation" to refer to whether an IHE is known for delivering high-quality services to their customers, such as the success of students in earning a degree or finding a job in their field of study. Graduation and job placement rates would be considered indicators of whether an institution has been successful in improving its reputation. In contrast, prestige is meant to capture whether an institution has acquired assets that are consistent with the perception of providing a high-quality education. Prestige is a more intangible construct than reputation and may include the quality of students who enroll, the production process used for education, and even the look and feel of a campus. Possible indicators of prestige might include institutional rankings in *US News and World Report* and average SAT scores of incoming freshmen.

Using this distinction, Brewer et al. (2002) placed institutions into the following strategic categories: prestigious, prestige-seeking, and reputation-based. Prestigious institutions are those that have already achieved a high level of prestige. Prestige-seeking institutions are those that have made investments to raise their prestige, but they are not yet viewed as prestigious relative to the leading institutions. Those institutions that are neither prestigious nor actively trying to acquire prestige are described as reputation-based institutions.

Finally, there have been a few attempts to model the ways in which colleges interact and compete with each other. Early work by James (1978, 1986) and James and Neuberger (1981) attempted to describe university behavior by assuming that institutions functioned as price takers, whereas Leslie and Johnson (1974), Massy (2004), Epple et al. (2006) and others countered that colleges exerted considerable market power and influence over prices. Rothschild and White (1993, 1995) outlined a theoretical model to explain how colleges and universities compete for students using price and nonprice means. An important feature of their model was the recognition that in education, students are both inputs and outputs from production. Rothschild and White (1993) dichotomize postsecondary education into "graduate education and research" and "undergraduate education," wrongfully implying that research is not associated

with undergraduate education and teaching is not associated with graduate education. They then go on to dismiss the idea that undergraduate education subsidizes graduate education and research with the argument that an industry with joint undergraduate and graduate production at some institutions and single undergraduate production at others would not be sustainable; that we observe this industry implies that there are no subsidies. Despite the validity of their argument (if A, then B; thus, not B implies not A), Rothschild and White's premise (A) is a compound event: if institutions of higher education faced the same regulations, and if they all produced the same undergraduate product, and if students and their parents had accurate information, and if firms were free to enter, and if undergraduate education subsidizes graduate education, then undergraduate institutions and joint graduate and undergraduate institutions would not coexist. Existence of the different types of producers implies only that at least one of the many premises is wrong. Curiously, in discussing the issue of subsidies, Rothschild and White never address the issues and evidence advanced by critics such as Anderson (1992) as to which one of the many premises is wrong.

Economic Concept of Markets

What, exactly, is a market? Economists have adopted a fairly consistent approach to answering this question dating back at least to Marshall (1920), although as noted by Leslie and Johnson (1974, p. 5), "...while it is a relatively simple matter to describe a potential market it is considerably more difficult and often impossible to specify exactly who is and who is not a part of that market." Virtually, every introductory-level microeconomics textbook devotes multiple chapters to defining the relevant market for goods and services, market participants and how they interact, and the structure of the market. Despite having general agreement about the purpose of a market and the main characteristics of a market, even economics textbooks can gloss over some of the finer details about defining a market that can have important implications for how to conceptualize markets in higher education.

Defining a market is a purposive exercise – it is done not for its own sake, but to serve the broader purpose of providing the analytical basis on which the behavior of one or more suppliers can be analyzed. In other words, the act of defining a market is a focusing device that seeks to identify the key players and their interactive strategies that determine the environment we seek to assess and, presumably, improve through the development of appropriate policies. The institutions that make up a market will exercise some meaningful constraint on each other, whereas those not assigned to this market will have no tangible immediate competitive impact on these institutions. Competitive processes within markets can be studied to assess whether institutions and markets are achieving true economic efficiency (reflecting an allocation of goods and services that provides the greatest benefits at the least cost), and if they are not, what market incentives or government regulatory intervention initiatives could be used to encourage more competitive behavior that will lead to greater benefits from society's scarce resources.

Characteristics of Markets

Economists begin by describing a market as the place where buyers and sellers come together to exchange a particular good or service.² The market may be a specific physical location (such as the Mall of America in Bloomington, Minnesota) or a geographic region (such as a 60-mile radius around Athens, Georgia). The different goods or services produced by suppliers in the market must be viewed by consumers as being reasonable substitutes for each other. For example, a single market would not be said to exist for cameras and pizza because consumers would not typically view these as even imperfect substitutes for each other. In contrast, one could define the fast-food market for a geographic area as consisting of restaurants that supply a variety of foods such as hamburgers and tacos, which may not be exactly the same, but are still substitute goods for many consumers who are looking to purchase dinner within a specific price range.

Markets are also separated by economists into either markets for goods and services made by organizations (“product markets”) or markets for resources such as labor that are used to produce goods and services (“resource markets”). Ford Motor Company is a supplier in the product market for automobiles, a demander in the labor market for engineers and technicians, and a demander in markets for steel, rubber, glass, and other resources needed to produce automobiles. This distinction is particularly important for identifying markets in the higher education industry due to the multiproduct nature of colleges and universities and their need to compete for resources from multiple groups including state and federal governments and donors.

An important feature of markets is the geographic span over which the market exists. The geographic span relates to how far customers will travel to purchase the good or service. Does the behavior of hotels in one city directly affect the conduct of those in another? If not, then there is no competition between them so they cannot be said to operate in the same analytical market. For example, are hotels in New York City in the same market as hotels in Sydney, Australia? Do travelers see them as close substitutes? Clearly not business travelers, who may not have a choice of where to conduct their work. Leisure travelers who have already chosen their destination will likewise define the geographic scope of their market in terms of only hotels that are in the vicinity of their destination. In contrast, for a world convention, large five-star hotels in these two cities could well be competing with each other in the same international market for an association’s business for the “customer” is not as place bound as in the prior two examples. To illustrate, in the United States, there are only a few cities with the five-star hotel capacity to cater to very large conferences such as the annual meeting of the American Economic Association, which in 2005 and 2006 attracted well over 8,000 registrations each year and used 5,122 and 5,688 hotel rooms, respectively, on the peak conference night. Only a few cities have sufficient hotel space to host such a large conference, so the market for conferences with this number of people would only include a small number of cities over a rather large geographic span.

The geographic span of a market is also influenced by the size of the purchase and the frequency with which consumers purchase the product. The geographic

market would be determined by how far buyers would be prepared to travel in order to think that they had found the best deal – a benefit-cost trade-off for them. The span for large and infrequent purchases (such as an automobile) is probably larger than the span for the market for groceries, where purchases are done more frequently and each purchase is a smaller portion of the consumer's budget. Supermarkets will generally compete in a narrow geographical span, the boundaries of which will usually be determined by the location of major roads, the presence of shopping malls, and the travel time preferences of consumers. For new car sellers located in a specific area, and who for whatever reason are the subject of a search that needs to be conducted within the confines of a defined market, it would be necessary to discover what other dealers in which other locations constrained the activities of the sellers in question and which dealers were seen by buyers as offering a substitute product, after allowing for search costs. Similarly, postsecondary education can be viewed as a relatively large and infrequent purchase, which helps explain why students are often willing to travel hundreds if not thousands of miles in order to use the service.

Industry Versus Market

As may be apparent in our use throughout this chapter, an important distinction should be made between an industry and a market. An industry, as used by economists, refers to the collection of all organizations that supply a specific good or service. For higher education, the broadest definition of the higher education industry would consist of all postsecondary institutions around the globe. It is also common to speak of an industry within a nation, such as the higher education industry in the United States. Within an industry, there may be a number of organizations that make the same product and yet do not directly compete with each other in the product or resource markets in question. As a simple illustration, the hotel industry can be thought of as consisting of all suppliers of hotel rooms within the United States. However, the Holiday Inn in Indianapolis would likely not view itself as competing with the Marriott in San Diego for most customers on any given evening. In this way, the two hotels are in the same industry but compete in different product markets.

A second distinction between an industry and a market is that a market consists of both buyers and sellers, whereas an industry is defined in terms of sellers producing similar products using similar inputs, technology, and production processes. That is, the term “industry” focuses only on the supply side, whereas Leslie and Johnson (1974, p. 5) note that “...there are two distinct parts or sides to any market: the producer's side and the consumer's side. Thus, in discussing a market for a particular commodity both sides of the market must be discussed.” We could talk about the US bread industry in an economically meaningful way if we wanted to analyze bread-making technology, the optimum size of baking ovens, the types of bread and yeast products, and the best types of flour to use. But it would not be correct to talk about

the US bread market in the same way, because all American bread manufacturers do not compete with each other for the same groups of buyers. Perishability, transport costs, and local taste preferences all mean that there will exist a large number of quite small geographic markets for bread, each of which may exhibit quite different patterns of competitive interaction and require different analytical assessments of their behavior. Unfortunately, even economists do not always distinguish between these two concepts. For example, in the principles-level microeconomics textbook by McEachern (1994), the author explicitly states that the terms “industry” and “market” will be used interchangeably. It is therefore not surprising that noneconomists have also struggled to understand the difference between these two terms as well.

On the demand side, customers help to define a market in a variety of ways. First, customers differ in their abilities to pay for a good or service. Generally, wealthier consumers will have a wider range of suppliers from which to choose within an industry, whereas less well-to-do consumers would have more limited choices. It is common for consumers with different income levels to participate in different product markets for goods and services such as restaurants, automobiles, housing, wine, sailboats, and even higher education. Second, the personal characteristics of consumers may affect the markets in which they choose to participate. For example, within the music industry, younger consumers may have different tastes than older consumers in the sets of music groups that they would consider close substitutes for each other. Other personal characteristics of consumers, such as their gender and race/ethnicity, can also influence the specific product markets within an industry in which they choose to participate.

Market Structures

Economic textbooks devote significant attention to the concept of market structure, which can be thought of as “...all of the characteristics of a market that influence the behavior of buyers and sellers when they come together to trade” (Lieberman & Hall, 2000, p. 172). These characteristics include the number of buyers and sellers in the market, the barriers to entry and exit from the market, and the homogeneity of the good or service being produced. All of these characteristics are helpful when thinking about the various markets that exist in higher education.

The number of sellers in a market is affected by the presence of barriers to entry or exit. These barriers represent how difficult it is for new suppliers to enter a market when conditions are favorable or how easy it is for suppliers to leave a market in less lucrative times. Barriers to entry in a market may be due to the presence of large fixed costs to enter the market. For example, a supplier wishing to enter the market for electricity provision would have to spend a large amount of money to create a power plant and accompanying infrastructure to deliver electricity to consumers. Governments can also be another barrier to entry if they impose laws or regulations on markets that make it more difficult – or even impossible – for new suppliers to enter the market. Similarly, in some markets, it is not easy for suppliers to leave due

to government regulations or high expenses that would be incurred from closing. Not surprisingly, markets where there are low barriers to entry or exit tend to have more suppliers, and vice versa.

The number of suppliers in a market is important in that as the number increases, holding all else constant, each supplier would normally have less market power, or ability to impact the prices charged for the good or service through their actions. At the extreme, if there was only one supplier in the market (a monopolist), then the supplier (monopolist) would not have to worry about losing customers to another supplier if they were to increase the price for the good or service, and the price they charge becomes the going price in the market. In contrast, if the market consists of many suppliers and each has a very small share of the total market output, then the pricing decisions of one supplier may have a negligible or no effect on the overall price set in the market.

The homogeneity of a product relates to the similarity of the goods or services produced by suppliers, and hence the degree of substitutability across suppliers. If the goods or services in a market are exactly the same (homogeneous), then consumers know that they can obtain the same exact product from any supplier in the market. Thus, the goods and services produced by suppliers are said to be perfect substitutes for each other. In contrast, a market with heterogeneous goods or services is one where the goods/services are similar, but not identical, across suppliers. It is important to note that the homogeneity of goods or services is defined by how similar they are in the minds of consumers and not necessarily whether there are real or tangible differences between products. If supplier A can convince consumers that their product is different from that made by supplier B, then the products in the market are heterogeneous even though in reality they may be exactly the same.

In most cases, markets consist of products that have some degree of perceived heterogeneity. The 2001 Nobel Memorial Prize in Economics recipient and former senior vice president and chief economist of the World Bank, Joseph Stiglitz (1987), wrote:

Markets in which commodities are completely homogeneous – with respect to location and the date as well as other characteristics – are almost inherently sufficiently thin so that the postulate of perfect competition is inapplicable. Markets that are sufficiently ‘thick’ to be competitive are almost always nonhomogeneous. (p. 25)

What Stiglitz is saying, in the former case, is that in order to have perfectly homogeneous products, the market may well be very narrowly characterized, as with a single product or single seller. In the latter case, he is acknowledging that competition can take place in terms of many variables, including product quality, ingredients, and style, so that in a competitive market (speaking in the real world sense of the term “competitive”), the products of rival sellers are unlikely to be homogeneous.

If products can be different from each other and yet be considered part of the same market, then at what point would two goods/services be so different that they are actually in separate markets? Where to draw this product boundary between markets is often difficult to determine and can be controversial. The product boundary of a market, in fact, indicates which products of rival institutions are seen as

substitutes in the minds of buyers. These substitutes do not have to be perfect. To illustrate, do the five-star hotels close to Central Park in New York City compete for guests with the two-star hotels on the outskirts? If the Holiday Inn at LaGuardia Airport lowers its nightly rate by a few dollars, will the Plaza on Central Park be forced to lower its rate? Highly doubtful! Thus, they operate in different markets. But where does one draw the line? The key is that ideally, those hotels classified within the same market will constrain each other (in terms of price, services, and amenities), whereas those that are not included in the market will not be regarded by travelers as offering a substitute product at going market prices, either now or within the planning horizon of the firm in question.

Taken together, economists have used these concepts to define several market structures that serve as standards by which existing markets may be compared and contrasted. At one extreme of the range of market structures is the notion of a perfectly competitive market, in which there are no barriers to entry/exit, there are a large number of buyers and sellers each with a small share of the market's output, and each seller produces a homogeneous product. In this market structure, suppliers have no ability to raise the market price through their actions given that consumers can find the same exact good or service at other suppliers for a lower price. The perfectly competitive market structure is admittedly a theoretical construct that is difficult, if not impossible, to find parallels to in existing markets.

At the other extreme of the spectrum of market structures is a monopolistic market. In this market structure, there is only one seller of the good or service and (obviously) significant barriers to entry. The good or service provided by the firm in a monopolistic market is very heterogeneous in that there are no close substitutes for it. Accordingly, the firm in a monopolistic market has significant influence over the market price for the good/service and the quantity of the good/service that is available to consumers. This market structure is also a theoretical construct in that it is hard to find many examples in the real world where pure monopolies exist. However, there have been instances where governments have established a monopoly for a specific good or service, such as the government-imposed monopoly that existed for years for local telephone services provided by AT&T. It may also be the case that local monopolies exist for goods/services that are narrow in geographic span, such as for water and electricity in a given town. These firms may function as if they were monopolists for they are the only supplier in the relevant geographic span, even though their respective industries may consist of many firms. Despite the fact that K-12 public schools are sometimes described by critics as being local monopolies, it is important to note that there are other competitors within the region including private schools, charter schools, magnet schools, and even homeschooling.

Between these two extremes are market structures known as monopolistic competition and oligopoly. In a monopolistically competitive market, there are low barriers to entry (and hence a large number of suppliers), but the goods or services are not identical across suppliers. In this market, firms attempt to differentiate their product from those of their rivals and may compete on both price and nonprice features (such as the quality of service). A fast-food market is typically used as an example of a monopolistically competitive market because there are many suppliers

within a geographic span, it is relatively easy to enter and exit the market, and the products are substitutable, but not identical across suppliers.

In contrast, an oligopolistic market consists of a small number of firms that typically produce a relatively homogeneous product. These markets have high barriers to entry due to either large start-up costs or government regulations. Firms can be tempted to engage in collusive behavior to minimize price competition, as was seen during the 1970s with the cartel of oil-producing nations in the Middle East. As discussed earlier in this chapter, allegations were raised in the 1990s that MIT and the Ivy League institutions in the United States were operating as if they were an oligopoly and colluding to fix prices by making similar financial aid offers to students. Other examples of oligopolistic markets outside of academe may include television services (cable and satellite providers) and air transportation.

Product Differentiation

As can be seen from this discussion, product differentiation is an important dimension in defining the market for a good or service. Suppliers can differentiate their product in a number of ways, the most obvious of which is to make physical changes to the good or service that make it different from, and yet substitutable for, those produced by other suppliers in a market. Advertising is often viewed as a way for firms to convince consumers that their product is different from, and better than, the products made by rivals in the market. Regardless of how it is achieved, the supplier's hope is that through differentiating its product, it may be able to increase its market power and charge a higher price for their particular good or service. In the extreme, if the level of product differentiation becomes large enough, the market may become segmented into several submarkets with suppliers of higher-quality goods/services competing in a separate product market from suppliers of lower-quality (but similar) goods/services. For example, the market for automobiles in a given geographic region may be thought of as a series of submarkets, in that consumers who are looking to purchase a higher-quality (and more expensive) automobile will primarily consider suppliers such as Lexus, BMW, and Mercedes-Benz, whereas other consumers who are looking for more affordable automobiles will participate in a separate submarket of firms such as Ford and Chevrolet. If all automobiles were perceived by consumers to be perfect substitutes for each other, then such market segmentation would not exist.

Product differentiation is related to the ease at which consumers can acquire information about the quality of the goods and services produced by suppliers. The model of a perfectly competitive market assumes that consumers have access to complete information about the products being sold by suppliers in the market. However, if consumers have difficulty in determining how comparable goods and services are within a market, then it creates opportunities for suppliers to convince consumers that their products are in fact different and thus deserving of a higher price. The requirement of consumers having perfect information about products

within a given market is very difficult, if not impossible, to realize in practice due to the time and cost that is needed to obtain this information. As a result, consumers often form impressions of products based on indicators of quality such as ratings by other entities such as *Consumer Reports*.

In the absence of good information, consumers may also rely on the price charged by the supplier as an indicator of quality, with a higher price suggesting to them that more/better resources went into its production and thus the resulting good or service is also better. In part, elite liberal arts colleges differentiate themselves from perceived lesser institutions by their higher tuition (price). To lower their price would give the wrong signal to those seeking an elite higher education. Note that this pricing signal would not exist if students and their parents (consumers) had perfect information about the products sold by colleges (suppliers).

Markets can be affected by how easy it is for consumers to learn what prices suppliers are charging for the good or service. The model of a perfectly competitive market assumes that consumers have full knowledge of the prices being charged by all firms. As the products in this market structure are perfect substitutes for each other, a supplier cannot get away with charging a higher price than others because consumers can get the same exact product at any number of other suppliers in the market and they know what prices other suppliers are charging.

The assumption that consumers have full knowledge of all prices within a market can be difficult to achieve in practice. It is typically the case that acquiring information about prices is a time-intensive and thus costly activity. The expansion of the Internet has certainly made it easier for consumers in many product markets to compare prices and products across suppliers. Searching and comparing prices and products still requires time and effort, however, and the comparison may be incomplete if it does not include all suppliers in a specific market.

Pricing information can be more difficult for customers to obtain in markets where firms engage in frequent price discounting. Even though consumers can find information on the manufacturer suggested retail price for virtually any brand of automobile across dealerships within a designated geographic area, the actual net price that they would pay depends on the extent to which a specific dealership (and perhaps salesperson within a dealership) is willing to negotiate with buyers for a lower price. Such information is not readily available to consumers. A similar process of price discounting occurs in higher education product markets, where students can observe the same posted tuition and fee rates for an institution but may end up paying different prices due to the fact that they are given varying amounts of financial aid for criteria such as their ability to pay and their academic performance.

Another important feature of some markets is that consumers actually purchase a bundle of (complementary) goods or services as opposed to a single product. To illustrate, when a person buys a house, the person is not only paying for the physical attributes of the house, such as its square footage, number of bathrooms, and acreage, but also access to attributes of the neighborhood where the house is located. These attributes might include the quality of the public school to which residents are assigned, the availability of parks and playgrounds, the safety of the neighborhood,

and even the perceived beauty of the view from the house. Accordingly, these attributes (complementary goods) can affect the price that consumers would be willing to pay for the house. Or as the old adage goes in real estate, the three most important factors in the price of a house are location, location, and location. Similarly, when a person goes to a restaurant, he or she is not only paying for the food consumed but also for the amenities that go along with the dining experience, such as the ambiance of the dining room, the quality of service, and other attributes. This notion of bundling certainly applies to higher education markets, where students are not only purchasing instructional services but also access to features of the campus and town that provide utility to the student.

Finally, products may differ depending on whether the consumer derives short-term (“consumptive”) or long-term (“investment”) benefits from purchasing them (Brewer et al., 2002). The majority of goods and services are primarily consumptive in nature, in that the purchaser obtains benefits near the time of consumption from the good or service in question. In other situations, however, the consumer does not receive the benefits until some point in the future. For example, individuals who purchase an exercise plan may not receive any benefits at the time that they use the plan, but still purchase the plan in the hope they will derive benefits in the future due to improvements in their health and fitness. Viewed in this way, the consumer is purchasing the good or service as an investment in much the same way that an individual purchases a mutual fund in the hope that it will be worth more in the future. As we explain in the next section, this applies to higher education product markets because higher education services provide both consumptive and investment benefits to students.

Attributes of Higher Education Markets

We now apply the economic framework from the previous section to discuss how economists would conceptualize markets within the higher education industry in the United States. In short, we assert that (1) IHE compete in a variety of product and resource markets, (2) the higher education industry consists of a series of different product markets within degree levels and fields of study, and (3) the product markets share characteristics with both an oligopolistic and monopolistically competitive market structures.

Before delving into the details of product markets in higher education, we need to consider the claim that markets are meaningless in higher education in that colleges and universities are not the same as firms in the for-profit world. The argument goes that due to the fact that most traditional colleges and universities are not-for-profit, are highly subsidized, and have a low risk of failure, they do not have to compete with each other in the same way as do firms in the for-profit sector.

A free market starts with the notion that there are many identical and independent firms, each with the objective of maximizing profits subject to constraints and many independent potential buyers who are seeking to maximize utility subject to

income and wealth constraints. However, the majority of degree-granting postsecondary institutions are not set up as profit-maximizing entities to benefit the equity capital shareholders. Gordon Winston (1999, 2000, 2003), possibly more than any other economist, has articulated how IHE differ from the textbook idea of profit-motivated firms operating in a competitive free market.

What is the main objective of postsecondary institutions, then, if it is not profit maximization? Winston asserts that a primary objective of IHE is to build prestige and attempt to advance up the hierarchy. But which hierarchy? From unknown to known? On what scale? From a local student body to an international mix? From the bottom of the sports world to the final four? From a liberal arts college to a university with multiple colleges including professional medicine and law schools? From undergraduate teaching institutions to well-recognized graduate schools producing Nobel Laureate-level research? Postsecondary institutions have different objectives at different times in their history. The only thing that appears safe to say is that profit maximization for the benefit of equity shareholders is not typically one of them, but yet this is a cornerstone of analysis in the typical market setting.

Unlike most firms in the for-profit world, colleges and universities are highly subsidized organizations. IHE receive subsidies from a number of different entities, including governments (federal, state, local), private donors, philanthropic groups, and others. Winston (1999) and Toutkoushian (2001a) have shown that a sizable fraction of the cost of providing higher education services is subsidized by various entities. This remains true in the twenty-first century even though increasingly larger portions of the cost of higher education services are being paid by consumers. Grants and state appropriations make it possible for both private and public institutions of higher education to sell their products for less than cost, which is a highly unique attribute not seen in most other markets.

Another way in which colleges and universities differ from traditional for-profit firms is that there is a very low risk of failure. Data from IPEDS show that in 2010–2011, for example, only twenty (20) degree-granting postsecondary institutions closed their doors and all of these institutions were private (National Center for Education Statistics [NCES], 2011). Public institutions enjoy some degree of protection from failure by state governments or coordinating and governing boards. The fact that there have been few college closings even in years when there has been significant economic downturns in the United States that have led to cuts in appropriations for many institutions shows that the risk of failure is low relative to what firms in many other industries face. If this is true, then the argument goes that colleges do not have to worry about competing for customers as they most likely will be able to survive regardless of their success in attracting students and securing resources.

The way in which colleges and universities provide higher education services is likewise different from the traditional industrial process in which labor and raw material inputs are turned into finished good (outputs). Students are consumers of educational services provided, inputs into that process, and they are also one dimension of output. As a result, the supply side and demand side of higher education markets are not “distinct” as asserted by Leslie and Johnson (1974) because (as will

be discussed in more detail) students are both consumers and inputs to the educational process. Demand and supply curves cannot be identified as distinct functions. In comparison to an automobile factory, the steel in a car does not care how it is handled but as inputs and outputs, students do. The car producers have to cover their costs with sales revenue but universities and colleges have endowments and state funds on which they can draw to subsidize the educational process. As inputs, the attributes of the student are important to production so institutions buy or subsidize desired students. Grants and state appropriations make it possible for both private and public institutions of higher education to sell their products for less than cost, which is a highly unique attribute not seen in other markets.

It is the case that producers of luxury items want the availability of their wares to appear limited and to be seen with the beautiful people. These producers are willing to provide incentives (subsidies) to encourage use by opinion and fashion makers. Similarly, but to a larger extent, prestigious colleges and universities do the same thing. For example, Harvard, Princeton, Stanford, and other highly selective universities could greatly increase their respective tuition and fees and likely still have students clamoring to get in (at least in the short run). They do not do this for they want to select what each considers the most appropriate attributes for the activities and images they each wish to project. At the same time, they cannot lower their prices too much because price is an indication of quality.

As we will discuss in what follows, highly selective private colleges in the United States are notorious for maintaining high sticker or list prices and then providing discounts in the form of grants, scholarships, merit aid, and the like to attract desirable students. In economics this is known as the “efficiency wage hypothesis,” which states that wages can be determined by more than simply supply and demand. To get the best workers (students), firms (colleges) pay their employees (enrolling students) more than the market-clearing wage (market-clearing financial aid). Because workers are paid more than the equilibrium wage, there will be lines of applicants looking to get these jobs. Thus, the existence of “efficiency wages” is a sign of market failure.

The importance or role of multidimensionality in higher education appears lost on many critics. In a *Wall Street Journal* review of Andrew Rosen’s book *Change.edu: Rebooting for the New Talent Economy* (2011), for example, Rifey (2012) argues that research universities and even liberal arts colleges are attempting to please too many constituents, which Rosen and Rifey call customers in a market place: students, parents, taxpayers, alumni, sports fans, and the list goes on.³ According to Rifey, “this mix of financial imperatives can lead colleges to focus too little on what students are learning in the classroom. Money and effort, instead, go to moving up the prestige ladder, often by enhancing ‘selectivity.’” Rifey then cites Rosen’s claim (in a chapter titled “Harvard Envy”) that under “the existing rules of higher education, a college is defined as ‘better’ by turning away more potential students – no different than a nightclub that’s ‘hot’ in that its system of bouncers and velvet ropes leaves a critical mass of people on the outside, noses pressed to the glass.”

How diverse constituents operating in many different markets result in a single measure of quality (entering-class selectivity) is never made clear by Rifey or Rosen;

it is only asserted. Their solution to confusion over the many purposes of higher education, however, is the single-purpose profit motive driven by student tuition. According to them, for-profit institutions have largely opted out of the prestige game. These schools are not looking to turn away students. Their professors are engaged exclusively in teaching, not research. No one has tenure, so incompetence means dismissal. Teaching is quality-controlled and student performance strictly measured.

Although Rosen meant his comments to be derogatory, in some respects, highly selective institutions of higher education share much in common with the idea of hot nightclubs, which Rosen does not recognize in his emphasis on selection as a negative attribute. Student groupings (peer effects) are important in education: bright and highly motivated students want to be with other bright and highly motivated students just as socially adept and attractive dancers in a nightclub want to be with similar club goers. Also keep in mind that students are an input and output of the educational process and dancers are an input and output of the nightclub scene. In any given evening, the hot night club might be able to earn higher profits by letting more dancers, in but in the longer run, profits might fall as the quality of the experience is deteriorated. Similarly, highly select colleges and universities may be able to make greater profits by admitting more students but in the longer term the quality of education may be deteriorated. College admission committees provide a screening function just as bouncers do but based on different criteria.

We acknowledge and accept that these are important differences between post-secondary institutions and traditional firms in the for-profit world, but also believe that it is appropriate to characterize IHE as competing with each other in markets. Postsecondary institutions must generate sufficient revenues to meet expenditures and run their operations, and tuition revenue remains an important source of funding for virtually all institutions. Even not-for-profit institutions must generate sufficient revenues to cover their operational costs, and thus competing for students (and the revenue they bring) is necessary for colleges and universities. IHE must likewise compete with other state agencies for appropriations and compete with other organizations for donations from individuals. In addition, based on the hierarchical nature of markets where enrolling high-quality students lead to institutional prestige, many colleges compete with each other not only for the number of customers but also for the best customers in the market.

We assert as have others before us (Brewer et al., 2002; Jongbloed, 2003; Leslie & Johnson, 1974; Meek & Wood, 1997; Rothschild & White, 1993) that colleges and universities participate in separate markets for students and resources. Though we focus here on competition among IHE for students, there is also competition between IHE for state funding, private funding, faculty, and so on. The markets for full-time, tenure-eligible faculty are usually national in geographic scope for most 4-year institutions. Within the labor supply of faculty, individuals who are more oriented toward research will more often choose to supply their services in the labor markets at Doctor- and Master-degree-granting institutions, whereas other individuals will gravitate toward the labor market at Bachelor-granting institutions. In contrast, the faculty labor market for 2-year institutions tends to be more regional/local in geographic span, as is true for the nontenure track labor markets for

4-year institutions. The market for sponsored research is best described as national in geographic span, with Doctor- and Master-degree-granting institutions across the country competing for research funding from the federal government and private agencies.

Postsecondary institutions offer a number of different services that may be useful for grouping them into product markets. First, colleges provide a mix of services in the general areas of instruction, research, and public service. The mission of a college or university will dictate the extent to which it chooses to provide services in each of these areas. The vast majority of institutions of higher education provide some form of instructional services; however, there are exceptions where an institution may be established solely for the purpose of producing research. Likewise, although many institutions engage in some level of public service activities that are aimed at benefitting the institution's local, state, or national communities, these activities tend to be a small portion of an IHE's overall activity. There is, however, significant variability across institutions with regard to their involvement in research, with many institutions doing little if any research, whereas other institutions devote significant attention to this activity.

The variation in research activity is often tied to the types of academic degrees offered to students. It is usually the case that institutions that have chosen to offer higher-level (graduate) degrees are also more involved in producing research due to the need to integrate research with teaching in the preparation of graduate students (Becker & Kennedy, 2006). Universities that focus on research are more expensive to maintain than are teaching-oriented institutions, but it has been asserted that they are critical to economic growth. Romer (1990) defines innovation as an improvement in the instructions for mixing raw materials. He argues that advances in technology are the primary source of economic growth in that the creation of new instructions can occur without bound and these instructions can be used over and over again at next to no additional cost. They are nonrival, meaning one person's use of the instructions does not rival or preclude its use by another. Although improvements in the instructions by which resources are mixed can occur by chance, Romer argues that innovation is the result of intentional actions taken by people who respond to market incentives. For an innovation to be profitable, the owner must be able to exclude or prevent others from using it freely. Growth requires the input of an excludable but nonrival good.

To Romer, the basic skills (reading, writing, and arithmetic), machine skills (keyboard entry, monitoring instruments, filling out forms), and the like that are associated with rote or repetitive education are tied to the individual. Such human capital is a rival input because the person who possesses this ability cannot be in more than one place at the same time nor can this person solve many problems at once. This ability is also bounded by the population; it is embedded in physical objects. It cannot account for unbounded growth in per capita output for its accumulation must involve diminishing returns. In contrast, a new design, piece of software, or mathematical model is nonrival; once the design, software, and model have been created, they can be used as often as desired by as many people as would like at little to no cost. They are not closely tied to any physical object. Education that

contributes to the creation of these new ways of mixing raw materials can lead to unbounded growth. But the rivalrous skills associated with teachers who are not also engaged in creating knowledge are not sufficient for unbounded growth.

For the remainder of this chapter, we focus on the product markets for instruction. For illustrative purposes, we begin by assuming that product markets in higher education are first bounded by field of study within each degree level, such as the market for a Master's degree in economics, as depicted in Fig. 7.1. This categorization is drawn from how customers (students) identify the suppliers (institutions) they would consider for higher education services. In academe, students begin by selecting the type of degree they will pursue, either an Associate's, Bachelor's, Master's, or Doctor's degree. Students then or concurrently identify institutions that award the desired degree in the field of study (or major) in which they would like to specialize. From this subset of institutions, students might then choose the specific market of institutions after taking into account other considerations such as their desired geographic span, academic skills, ability to pay for college, and personal characteristics.

The connection between markets, degrees, and fields of study is very important at the graduate degree levels due to the fact that these degree programs primarily require students to take courses in their chosen field of study. Institutions that have chosen to offer Master's and Doctor's degrees may opt to only offer them in specific subject areas, and thus not all institutions that award Doctor's degrees will, for example, award a Doctor's degree in sociology. At the Associate's and Bachelor's degree levels, however, it is not always clear whether the appropriate definition of markets should include the field of study. From the perspective of students seeking an Associate's or Bachelor's degree, many of them either do not know what major they will choose when they decide to enroll in college or they may change majors during college. In this case, they may be more interested in the services at an institution as a whole rather than the services within a specific major. Institutions also compete with each other to some extent at the aggregate (institutional) level as well as the field level. Many institutions do not set specific enrollment targets by field of study and instead make strategic decisions to influence the size and quality of all incoming students regardless of major. Nonetheless, the aggregate level is ultimately affected by the institution's ability to compete for students with other institutions that offer the same major and degree within a designated geographic span.

On the supply side of product markets, an IHE has to decide which degrees to offer and in which fields to do so. These decisions are influenced by the mission of the institution, the markets in which they would like to compete, and any rules or regulations at the state level that might restrict their ability to move into specific markets. In some states, a public IHE would have to get approval from a state board or commission before being allowed to start a new degree program.

Table 7.1 shows the distribution of colleges and universities in the United States in 2010–2011 by highest degree offered, broken down by control and profit status from the Integrated Postsecondary Education Data System (IPEDS). As shown, there are almost 4,600 degree-granting institutions in the higher education industry in the United States. Of these institutions, approximately one-third focus mainly on Associate's degrees and thus are said to be in the 2-year sector, and the remaining

Fig. 7.1 Depiction of process for students to identify higher education market

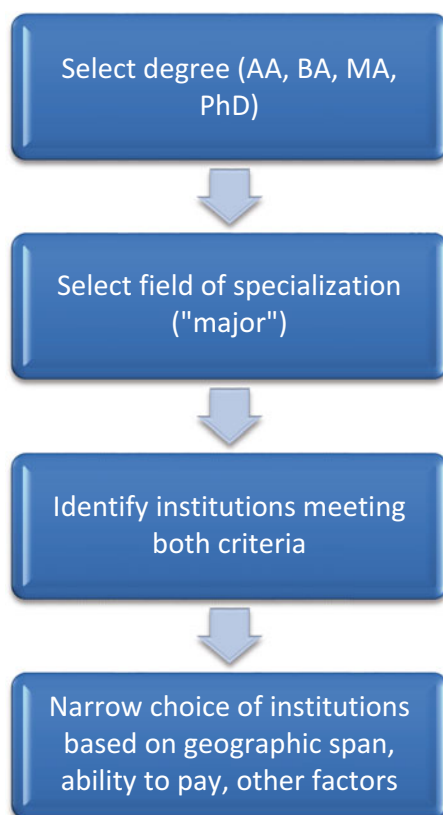


Table 7.1 Breakdown of institutions of higher education in the United States by highest degree awarded, 2010–2011

Highest degree awarded	Institutional control			Total
	Public	Private not-for-profit	Private for-profit	
Associate's degree	978	87	664	1,729
Bachelor's degree	132	381	373	886
Master's degree	226	595	225	1,046
Doctor's Degree	320	567	51	938
Grand total (2- and 4-year)	1,656	1,630	1,313	4,599
Subtotals:				
Bachelor's and higher	678	1,543	649	2,870
Master's and higher	546	1,162	276	1,984

Source: Table 4 from NCES Tables Library. US Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Fall 2010, Institutional Characteristics component

Notes: Only includes institutions that qualify for Title IV and grant degrees

institutions concentrate on degrees at higher levels and are considered to be part of the 4-year sector. The distribution becomes much more complex when IHE are further broken down by both degree level and field of study. For example, out of almost 1,000 institutions that award a Doctor's degree, only 139 of them offer a Doctor's degree in economics (<http://www.aeaweb.org/gradstudents/Schools.php>).

It is important to note how the industry is divided by institutional control. The total number of suppliers is fairly evenly split between public, private not-for-profit, and private for-profit institutions. As public institutions are on average much larger than private institutions, they award most of the degrees in the product market for instruction. Public institutions comprise a large share of institutions in Associate's degree markets, whereas private not-for-profit institutions are more likely to be found in the 4-year sectors. Private, for-profit institutions are highly concentrated in the Associate's and Bachelor's degree markets, with little (but growing) involvement in the markets for graduate degrees.

There are three complications that must be addressed to determine the number of suppliers in the industry at each degree level. The first complication is that some institutions in the 4-year sector also offer Associate's degrees. Therefore, a number of institutions in the 4-year sector compete with institutions in the 2-year sector for students seeking an Associate's degree. The second complication is that most institutions that offer Master's degrees also offer Bachelor's degrees, and most Doctor-granting institutions award both Bachelor's and Master's degrees. According to our calculations using IPEDS data for Title IV degree-granting institutions, in the fall of 2010, there were 3,162 institutions that award Associate's degrees, 2,609 institutions that award Bachelor's degrees, and 1,968 institutions that award Master's degrees. As noted earlier, the relevant markets within each degree level are much smaller than this once institutions are broken down by field of study and geographic span and other factors are also taken into account.

Table 7.2 provides an overview of some of the key attributes of the segments of the higher education industry by degree levels. As noted in Table 7.1, the number of suppliers in the segments of the higher education industry declines by level of degree. The number of customers, as represented by degrees conferred, also varies by degree level, with the largest number of students receiving Bachelor's degrees followed by Associate's, Master's, and then Doctor's degrees. With regard to ownership, the suppliers are a mix of public and private institutions, with Associate markets consisting of mostly public (and increasingly private for-profit) institutions and graduate markets consisting of private and public not-for-profit institutions. The degree levels of the higher education industry vary in terms of whether there are hierarchies of suppliers based on their prestige. At the Associate level, there is very little hierarchy based on prestige, whereas prestige is a significant factor at the Bachelor's and graduate degree levels. Finally, only a small minority of students seeking an Associate's degree will live on campus and attend college full-time. In contrast, the majority of traditional students pursuing a Bachelor's degree will live on or in close proximity to campus. Graduate students also tend to live on or near campus, but they may be more likely than Bachelor's degree-seeking students to attend college part-time due to outside commitments such as work.

Table 7.2 General characteristics of suppliers in US higher education industry by degree level

Characteristic	Associate's degree	Bachelor's degree	Master's degree	Doctor's degree
Number of providers	Many (~3,200)	Many (~2,600)	Many (~2,000)	Some (~1,000)
Number of degrees awarded in 2009–2010	849,000	1,650,000	693,000	159,000
Ownership	Public and private	Public and private	Public and private	Public and private
Profit status	Majority are not-for-profit, but many for-profit	Majority are not-for-profit	Majority are not-for-profit	Almost all are not-for-profit
Hierarchical nature of industry	Very little hierarchy based on prestige	Substantial hierarchy based on prestige	Some hierarchy based on prestige	Some hierarchy based on prestige
Residential status of customers	Few students are in residence; many attend part-time	Most students are in residence; many attend full-time	Most students (but fewer than Bachelor's degree) are in residence; many attend full-time	Most students (but fewer than Bachelor's degree) are in residence; many attend full-time

The hierarchical nature of the markets for Bachelor's degrees by institutional prestige is not unique to the higher education industry in the United States. In Australia, the long-established so-called "sandstone" universities (the original universities in each capital city) belong to what is referred to as the "Group of Eight." Another group of five relatively new universities (one in each of the five mainland states) that have grown from business-, technology-, and engineering-based origins is known as the ATN Group (Australian Technology Network). The two groups differ in reputation, history, and course offerings but compete with each other for research grants and, to a limited (but increasing) extent, for students willing to move interstate for tertiary studies. However, the competition for students is largely confined within the borders of the home state, among the different tertiary institutions located therein. A discussion of the changing picture of higher education in Australia is provided by Harman (2006). As with the United Kingdom, national policy is aimed at rewarding institutions for specific measured outcomes. This action can be seen as an attempt to solve a principal-agent problem (difficulties that arise under conditions of incomplete and asymmetric information), but it has nothing to do with what markets might produce if universities were left to their own devices.

Pricing in Higher Education Markets

The manner in which colleges and universities set prices for instructional services has puzzled many academics, policymakers, and students and their families. The price for attending college in the United States in 2012 (including tuition, fees, and room and board) can exceed \$60,000/year at private not-for-profit institutions and \$30,000/year at public institutions. Accordingly, it is not surprising that many stakeholders are concerned that the high price of going to college is severely restricting the postsecondary choices of many students.

Winston (1999) describes the price of higher education services as being the difference between the cost of providing the service and the level of subsidies (or donative resources) that the institution has been able to secure. This framework is important for it shows that the price charged to customers is only a fraction of the cost of providing the service. Institutions that are more successful at obtaining subsidies (through private donations, state appropriations, research funding, and so on) are thus able to charge lower net prices and build excess demand for their services. It is the excess demand that enables colleges and universities to then become more selective in which customers they choose to serve, which in turn raises their prestige within the higher education industry.

In addition to the connection between subsidies and pricing, there are several other important facets with regard to how prices are set in postsecondary education, as detailed in Table 7.3. Recall that one of the conditions of perfectly competitive markets is that consumers have full knowledge of the prices set by all suppliers within the market. This condition certainly does not apply to higher education

Table 7.3 Pricing characteristics in US markets for students by degree level

Characteristic	Associate's degree	Bachelor's degree	Master's degree	Doctor's degree
Variations in posted tuition	Lower than for B.A., M.A., Ph.D. markets	Large variations by public/private status, prestige of institution, level of subsidies	Some variations by public/private status, level of subsidies	Some variations by public/private status, level of subsidies
Price discounting	Some discounts for financial need	Substantial discounts for financial need, student ability (merit), and special student attributes	Substantial discounts for financial need, some discounts for student ability (merit); some discounts for graduate assistantships	Substantial discounts for financial need, student ability (merit); more discounts for graduate assistantships
Consumer information on prices	Easy to find posted prices, some difficulty finding net prices	Easy to find posted prices, more difficulty than AA finding net prices	Easy to find posted prices, some difficulty finding net prices	Easy to find posted prices, some difficulty finding net prices
Segmented pricing	Most students pay same posted price	Two-tiered pricing in public institutions for resident and nonresident students	Two-tiered pricing in public institutions for resident and nonresident students	Two-tiered pricing in public institutions for resident and nonresident students

markets for several reasons. Despite the fact that posted tuition and fees for each institution can be readily obtained from the Internet and various publications and college guidebooks, a substantial portion of students seeking a Bachelor's, Master's, or Doctor's degree pay different net prices due to financial aid (McPherson & Schapiro, 1998). Institutions may reduce the price charged to some students seeking a Bachelor's degree by giving them grants or scholarships due to financial need, academic merit, or special characteristics (such as a basketball scholarship). It is also common for graduate students to receive financial aid for need and merit, as well as assistantships for providing teaching or research services to the institution. In contrast, Associate level institutions focus primarily on price discounts for financial need. According to the College Board, in 2011–2012, a full-time undergraduate student received, on average, \$5,750 in grant aid and federal tax benefits at public 4-year institutions; \$15,530 at private 4-year institutions; and \$3,770 at 2-year institutions (College Board [CB], 2011). Even though the practice of price discounting is common across private and public institutions, consumers rarely know the exact amount of discounts they can expect at the time that they are making postsecondary choices; they must first apply to the institution and then be offered admission before they can see the true price that they would be charged.

The pricing of higher education services is affected by two additional factors. First, with a few exceptions, institutions set the same price for all fields of study even though they compete in separate markets. A student who wants to receive a Bachelor's degree in a high-paying field such as finance would pay the same tuition rate as another student who is seeking a Bachelor's degree in a lower-paying field such as history. In another industry, the firm would be able to set different prices for each market in response to supply and demand conditions. Second, prices are usually set for the entire year, even if market conditions change in the interim. This is due to the fact that consumers purchase higher education services at one or two points in time during the year. In contrast, in a local market for gasoline where consumers make frequent purchases, if a gasoline station were to lower its price to help attract more customers, other gasoline stations would be able to quickly match or exceed the price drop to help maintain their market shares.

Bundling of Higher Education Services

As noted earlier, students are purchasing a bundle of services when they enroll in a postsecondary institution. Universities do not produce a single output and students do not buy a single product from them. In addition to instructional services at the undergraduate or graduate level, institutions provide a range of noninstructional services and benefits. Students pay for the entire bundle of goods and services when they shell out tuition money. We break down the bundle of services into five categories as summarized in Table 7.4. The first category ("instructional services") relates to the quality of education that students receive at the institution. This quality will be influenced by the structure of the degree program, the content of courses, the quality of teaching, and

Table 7.4 Description of bundle of services students receive from higher education

Category	Description
Instructional services	Services that are directly connected to the quality of student instruction and learning. Includes classes taken, curriculum and pedagogy, research opportunities, quality of teaching, and quality of peers
Academic support services	Services that complement or enhance the instructional services received by students. Includes the library facilities and computing infrastructure at the institution
Student services	Services that help students become acclimated and succeed in college. Includes tutoring, counseling, academic advising, and job placement services
Extracurricular opportunities	Services that relate to opportunities for students to participate in on-campus activities from which they derive consumptive value. Includes intramural athletics, formal and informal socializing, and clubs
Locational attributes	Services that relate to the attractiveness of the institution's location (both campus and town) for students. Includes the quality of food and housing, the aesthetic beauty of the campus and town, and access to entertainment from athletic and cultural events

any effects that peers have on student learning. The second category for academic support includes all services provided by the institution that are meant to support the teaching mission of the institution. Although wireless Internet service and library materials are not part of an institution's instructional services, they can certainly facilitate student learning. Student services represent those services that institutions provide to improve a student's emotional and physical development outside of the classroom and in turn help them succeed academically. These services might include access to tutoring, counseling, and assistance with academic and career planning. By and large, these three types of services are all provided by institutions in varying quantities and are focused on the investment benefits from higher education.

The last two categories – extracurricular opportunities and locational attributes – are more difficult to define and clearly delineate from each other. They are unique in that they focus on the consumptive benefits of higher education because students value these services due to the immediate utility gained from them as opposed to the future benefits they may derive from them. We use the term “extracurricular opportunities” to refer to services in which students may be active participants, such as joining an intramural team, a club, the marching band, a fraternity or sorority, or even informal opportunities to form friendships with other students. The final category (“locational attributes”) is intended to capture benefits to students that are connected with the location of the institution and the town/city where the college resides. These attributes would not only include the scenic beauty of the campus and town but also the availability of entertainment and the quality of food and housing in the immediate area for students.

The breakdown of the bundle of higher education services is helpful as it enables us to better understand the range of attributes that students consider when making decisions in higher education markets. The tendency of many academics and policymakers is to focus on the instructional services portion of the bundle when thinking about what colleges should do. They fail to consider that the customers in the market also value the consumptive benefits from college when making enrollment decisions, and thus colleges must provide complementary services in order to compete with other institutions for students. In short, the reason colleges and universities spend considerable sums of money in activities such as developing athletic facilities, improving the landscaping on campus, expanding the menu of food options for students, and adding wireless Internet and other features to dormitories is that these services provide consumptive value to students which in turn may increase their demand.

The bundle of services that students are buying in higher education product markets differs by the type of degree they are pursuing. The noninstructional aspects of higher education services are arguably most important in Bachelor's degree markets where students may focus considerable attention on the amenities that go along with their instructional experiences. Students seeking a Bachelor's degree will often live on or near campus and are at an age where social benefits tend to be very important to them. In contrast, graduate students tend to be older and less interested in the noninstructional services that go along with their education. Students seeking an Associate's degree are likewise on average more focused on the instructional services in part because the majority of them do not reside on campus and thus do not look to the institution to provide as many supplemental benefits. Accordingly, 2-year institutions have opted to specialize primarily in delivering instructional services and do not spend considerable resources on amenities and noninstructional services such as creating football teams. As outlined in Becker and Andrews (2004), public community colleges with no research mission have thrived under the belief that a faculty devoted to research is not essential to performing the less-expensive teaching function. In the Master's and Doctor's degree markets, students will likely place less weight than Bachelor-seeking students on the consumptive value from going to college. However, as the majority of institutions that award Master's and Doctor's degrees also award Bachelor's degrees, graduate students usually find that suppliers offer them the same kinds of noninstructional services as they would to students seeking a Bachelor's degree.

Higher Education Markets by Degree Level

We are now in a position to provide a more complete description of the types of product markets for instruction that exist within the four main degree levels. For each degree level, we discuss the geographic span of markets; the focus, breadth, bundling, and homogeneity of services; the barriers to entry and exit; and the characteristics of students. These points are summarized in Table 7.5. Together, these

Table 7.5 Characteristics of US markets for instructional services by degree level

Characteristic	Associate's degree	Bachelor's degree	Master's degree	Doctor's degree
Geographic scope of markets	Within commuting distance of a student's home	National for high-ability students; regional for other students; separate markets in public IHE for in-state and out-of-state students	National for high-ability students; regional for nontraditional students	National for the majority of traditional students; regional for nontraditional students
Focus of service	Instruction	Instruction	Instruction and some research	Instruction and substantial research
Breadth of Service	Take courses in a range of subjects plus major of subjects plus major	Take courses in a range of subjects plus major	Take courses in one field of study	Take courses in one field of study
Bundling of service	Instruction, academic and support services; some extracurricular and locational	Substantial bundling of instruction, academic and support services, many extracurricular and locational	Some bundling of instruction, academic and support services; some extra curriculars and locational	Some bundling of instruction, academic and support services; some extracurriculars and locational
Homogeneity of service	Some heterogeneity: service varies by courses in program, quality of courses	Considerable heterogeneity: service varies by program content, course quality, nonclassroom attributes, prestige of degree from supplier	Some heterogeneity: less variation in degree content, still have variations in prestige from supplier	Some heterogeneity: less variation in degree content, still have variations in prestige from supplier
Barriers to entry	Fixed costs and government regulation, lower barriers than for B.A., M.A., Ph.D.	Fixed costs and government regulation; higher barriers than AA due to costs of nonclassroom attributes	Fixed costs and government regulation; lower barriers than B.A. Incur fixed and variable costs for research	Some barriers from fixed costs and government regulation. Incur added fixed and variable costs for research
Student characteristics	Lower academic ability; looking for career preparation and skills	Substantial variation in student academic ability; looking for general knowledge as well as career preparation	Above-average academic ability; looking for general knowledge as well as career preparation	High academic ability; looking for general knowledge as well as career preparation

attributes provide a fuller picture of how economists would conceptualize markets within the higher education industry. The reader should keep in mind that each of the degree levels contains separate markets defined by field of study and then the type of student within each combination of degree and field.

Geographic Span of Markets by Degree Level

The geographic span will tend to be smallest for Associate's degree markets and largest for Doctor's degree markets. Given that students seeking Associate's degrees usually do not reside at the institution, the Associate's degree markets are more properly defined by institutions that are within commuting distance of students. Students who participate in Master's and Doctor's degree markets, on the other hand, normally move to and live on or near campus and thus would consider institutions in a much larger geographic span (national or perhaps regional). There are thus fewer markets for graduate degrees than there are for Associate's degrees.

The geographic spans of Bachelor's degree markets fall in between these two cases. There are prestigious and highly selective universities who draw interest from academically talented students from around the nation (and the world) and do not have any particular regional appeal to students. Institutions in this market, such as Harvard, Princeton, Dartmouth, and Stanford, compete with each other in national markets for high-ability students. Other institutions offering Bachelor's degrees in specific fields primarily compete with other suppliers in the same geographic region. This occurs even though they enroll students from outside their primary region, provided that they tend to get the majority of student demand from within their immediate geographic area.

Public institutions often have a high degree of competition with other public institutions in the same state, even when they have substantial differences in prestige and mission. The competition is driven in part by proximity to consumers as well as the fact that they enjoy substantial price advantages for state residents due to appropriations from the state government. It is often the case that the state's most prestigious, research-oriented public institution will share significant numbers of resident applicants at the Bachelor's degree level with their teaching-focused institutions. Public institutions also operate in separate markets for resident and nonresident students at the Bachelor's degree level. This bifurcation is due to the importance given to enrolling sufficient numbers of in-state students and the additional revenue that can be gained from charging higher prices to out-of-state students. In fact, some public institutions set separate enrollment targets for in-state and out-of-state students.

Getz and Siegfried (1991, p. 12) called readers' attention to the fact that in the United States, higher education is relatively decentralized, with 50 separate state regimes and hundreds of private institutions run by self-perpetuating boards of trustees. Following Bok (1986), they argued that this decentralization has encouraged competition that is not associated with government-imposed fixed prices and quality mix. At the highest level, public and private institutions compete for the

same students at different prices and turn out students that are equally demanded by employers. Decentralization and competition have resulted in the United States having a less monolithic higher education establishment as reflected in Fallows (1990, pp. 17–18) observation that only two (Kennedy and Bush) of the then seven American presidents since 1960 graduated from elite private institutions, whereas all Japanese leaders graduated from a single college, the University of Tokyo, which also accounts for a third of all presidents of large corporations, 60% of senior government officials, and all postwar prime ministers but enrolls only 1% of the population (Rohlen, 1983, pp. 88–91).

In contrast to this view that the education and imprimatur from the elite colleges and universities differ little from the others, Bound, Hershbein and Long (2009) claim that increasing demand for admission to these highly selective schools is likely related to the notion that the institution a student attends has become increasingly important, citing the findings of Hoxby and Long (1999) that nearly half of the explained growth in the widening income distribution among college-educated workers is associated with the increasing concentration of peer and financial resources at more selective colleges and universities relative to other institutions. As emphasized by Hoxby (2009), Bachelor's degree markets have shifted from regional in focus to national. Also, as more workers become college educated, employers may view the average college-educated worker as less productive than in the past. Under this signaling type of framework, a degree from an elite college is alleged to become even more valuable in the future.

Focus and Breadth of Markets by Degree Level

With regard to the focus of service, the markets for Master's and Doctor's degrees combine aspects of research and instruction, in that an important part of a graduate student's education involves learning how to conduct research within a specific field of study. In contrast, at the Associate's degree level (and largely the Bachelor's degree level), the focus of the service is on instruction and not research.

The breadth of instructional services varies by degree level as well. Students seeking an Associate's or Bachelor's degree are paying for not only instruction in their primary subject of choice but also for instruction in other subjects that are needed as part of their general education requirements for the degree. In contrast, instruction at the graduate levels is focused almost exclusively on the student's main field of study.

Bundling of Services in Markets by Degree Level

The bundling of services occurs in different ways across the markets by degree levels. There is arguably the largest amount of bundling in Bachelor's degree markets, where students are not only purchasing instruction across a wide range of

subjects but also academic and student services to help them succeed, as well as consumptive benefits from extracurricular opportunities and locational attributes. Students in Associate's degree markets also purchase bundles of instructional and noninstructional services. However, given that students in these markets do not usually reside on or near campus, there is less emphasis placed on extracurricular opportunities and locational attributes that generate consumptive benefits. Similarly, on average, the consumptive benefits derived from extracurricular opportunities and locational attributes in graduate markets are likely to be lower than in Bachelor's degree markets.

Homogeneity of Service in Markets by Degree Level

Within the product markets for Bachelor's degrees, it is safe to say that there is a fair amount of product differentiation – both real and perceived – among suppliers. First, the courses required for students to obtain a Bachelor's degree within a specific major can vary across institutions. A student who earned a Bachelor's degree in sociology from College A likely received a different service from another student who received a Bachelor's degree in sociology from College B. Note that different course requirements across institutions apply not only to courses within the student's major but also for the general education and elective requirements needed for completing a Bachelor's degree. Viewed in this way, it is very difficult to envision two colleges providing the same exact set of courses for students who want to earn a Bachelor's degree in a given major. In graduate degree markets, the instructional services are also heterogeneous but arguably less than in Bachelor's degree markets for students who only take courses within their field of study.

Product differentiation across colleges and universities expands as one also considers other ways in which the services are delivered by colleges. The quality of each class can be affected by a number of factors, including the curriculum used for the course, the spillover benefits from interactions with peers, and the faculty member's ability to help students learn the material. For example, even though almost every college offers a course in introductory statistics, the specific content of the course can differ from institution to institution, and even from section to section within the same institution.

Higher education services can be perceived by customers to differ in ways beyond tangible differences in programs of study and course content. Prospective college students learn quickly in the college search process that it is difficult to obtain information about the factors discussed above, which makes it challenging to compare the quality of services offered by providers. As in other industries where this occurs, students often turn to indicators to estimate the likely quality of the service they would receive at different institutions. The growth of college rankings such as those produced by *US News and World Report* reflects the interest among students in finding information about the relative quality of suppliers within the higher education industry. Students also rely on the decisions of other consumers to provide

information about the likely quality of services at various institutions, with the notion being that the quality of education is “better” at College A than at College B if more high-ability students have chosen to attend College A.

Barriers to Entry in Markets by Degree Level

The barriers to entry and exit from higher education markets depend on the type of services rendered by the institution. The barriers to entry are highest for those providers who offer more traditional postsecondary education services for consumers (students) living on or near campus and pursuing a Bachelor’s, Master’s, or Doctor’s degree. For these providers, there can be substantial fixed costs for starting a 4-year, comprehensive college or university that would make it difficult for new potential institutions to enter the market. In addition, the number and scope of public (state supported) institutions that may operate within a state’s boundaries can be controlled by either the state government, higher education coordinating board, or public university system. At a minimum, such constraints would make it very difficult for new publicly supported institutions to enter the postsecondary markets in many states. As the fixed costs are likely to be smaller for 2-year colleges and/or colleges that provide services online to students, the barriers to entry and exit would be lower in markets comprised of these types of institutions. Barriers to entry also exist in graduate markets due to government regulations and expenditures needed to develop the research infrastructure to provide graduate degrees in selected fields. However, due to the fact that graduate programs are usually added by institutions that already offer Bachelor’s degrees, many of the fixed costs associated with starting an institution would not apply to graduate degree programs.

Characteristics of Students in Markets by Degree Level

There are a number of differences in the types of students participating in markets within the four degree levels. Students in Associate’s degree markets will likely be lower in ability and more homogeneous than are students who opt for Bachelor’s degree markets. When combined with the lack of hierarchy of Associate institutions by prestige and their use of open admissions policies, there is little sorting of students across institutions in Associate’s degree markets by academic ability. Students within graduate degree markets tend to be more homogeneous than students in Bachelor’s degree markets as they are typically drawn from the upper portion of the student ability distribution. There will be some sorting of students across institutions in graduate markets due to the hierarchy of graduate programs by prestige. In contrast, Bachelor’s degree markets in the USA consist of a wide range of students by academic ability, and higher-ability students seek to enroll in more-prestigious institutions.

Structures of Markets by Degree Levels

It is worth considering which of the four market structures discussed earlier (perfect competition, monopolistic competition, oligopoly, monopoly) apply best to the product markets for instructional services in higher education. In short, higher education markets are not exactly the same as any of the four structures, but they do have some similarities with these structures that are helpful for understanding how colleges behave in their respective markets.

First, it is clear that higher education markets are not perfectly competitive. This stems from the fact that higher education services are not homogeneous, there are substantial barriers to entry and exit, and consumers do not have perfect information about the prices charged by colleges and the quality of their respective services. Likewise, higher education markets cannot be characterized as monopolistic as there is certainly some degree of substitutability across IHE within every market. Even a highly prestigious institution such as Harvard, for example, has competitors such as Princeton and Stanford that are viewed by many consumers as fairly close substitutes within relevant markets.

An argument can be made, however, that the most prestigious and highly selective institutions in the United States operate in oligopolistic markets for Bachelor's degrees by field. These institutions are relatively few in number, compete at the national level for the best students, and have similar profiles of students, finances, and so forth. The institutions within a market can be thought of as the ideal collusive group (or the hypothetical monopolist test, as it is often now called in legal work); that is, in the minds of buyers, they are all essentially substitutable for each other, but products outside the group are seen to offer no relevant substitution possibilities. In other words, acting as a group, the institutions in a market could raise prices in small but nevertheless significant and nontransitory ways and not lose buyers to a rival's product. To the extent that Harvard, Yale, and like Ivy League institutions could jointly raise tuition and fees without altering their attractiveness to both domestic and foreign students, they would constitute a unique market. The oligopoly market structure may also be a fitting model for the best students at the Master's and Doctor's degree levels within specific fields, in that there are relatively few suppliers with high prestige that offer degrees within fields of study.

Perhaps the best description of market structures in higher education is that they are mixtures of monopolistic competition and oligopoly. Some higher education markets are similar to monopolistic competition in that the service offered by suppliers is very heterogeneous, and for those students who have large geographic spans to consider, there may be many suppliers offering Bachelor's degrees within their field of study. At the same time, markets may resemble oligopolies for there are notable barriers to entry and exit in higher education, and markets defined at the regional level (such as the market for Bachelor's degrees in history in the State of Indiana or the market for an Associate's degree in nursing within 60 miles of Ames, Iowa) may have relatively few suppliers.

Issues in Identifying Markets in Higher Education

The prior discussion laid out in general terms how economists would characterize the various markets that exist within higher education. However, it leaves open the question as to how to determine which institutions are in which markets. Identifying specific markets usually involves either obtaining information on which suppliers react to price and product changes by other firms or using decisions of consumers to see which suppliers they consider.

The traditional approach used in economics for identifying markets is to determine how potential competitors react to changes in price and services of another supplier. For example, consider the following three institutions: Ivy Tech Community College (Bloomington, IN), Indiana University (Bloomington, IN), and Harvard University (Cambridge, MA). Ivy Tech is a 2-year public institution with open enrollment, offering many remedial courses that do not count toward a degree and a range of Associate's degrees in fields such as nursing and business administration. Indiana University is a 4-year public institution offering a full range of Bachelor's, Master's, and Doctor's degree programs. It is relatively selective and draws students from Indiana and around the world. Harvard University is a highly selective, 4-year private institution that also offers a wide range of degree programs and competes on a national level for the very top students. Changes in the tuition rate charged at Ivy Tech will likely not cause Harvard to also change its tuition, and it is easy to see that they are in different product markets.

More interesting from an analytical policy perspective, however, would be to ask under what conditions would Ivy Tech and Indiana University (both located in Bloomington, Indiana) be considered to compete in the same market, and what are the consequences of viewing them as such? For example, Indiana University offers a Bachelor of Science in Nursing degree, which may be viewed by some students as a substitute for Ivy Tech's Associate of Science in Nursing degree in that both degrees are viable options for many entry-level nursing positions. Or would an introductory statistics class taught at Ivy Tech in the summer be a substitute for the same class taught at Indiana University for those students living near Bloomington who want to take an introductory statistics course in the summer? Ultimately, it may be a matter of subjective judgment and not an absolute as to where to draw the appropriate product-market boundary. Nevertheless, the task must be carried out, even if done with reservations.

The discussion above highlights the fact that the extent to which institutions compete with each other in markets cannot be neatly drawn along traditional categories of institutions. In the United States, we often find public institutions competing with private institutions and institutions of different prestige levels competing with each other for students. In fact, the work of Dale and Krueger (2002) suggests students who are accepted by the elite privates but who elect to attend a major state institution do better in later life. That is, the big major state university like Indiana University may, indeed, be part of the same market in which the high sticker-priced private institutions are alleged to form a relatively tight oligopoly. An interesting

market-related policy question is whether the major state universities can continue to compete with the private universities as state legislatures decree that credits from local community colleges, regional universities, and the like be accepted by their state-subsidized research universities. Or at the very least for some students, they may be considered as acceptable substitutes.

One way to conceptualize this issue draws on our earlier explanation of the bundling of instructional services. Recall that when students select an institution, they are taking into account the expected benefits from instruction, academic support, student services, extracurricular opportunities, and locational attributes. To put it another way, the expected utility for a student from choosing a given institution depends on the expected utility from the anticipated investment benefits (gross benefits minus costs) and consumptive benefits. Holding all else constant, students would expect higher utility from attending institutions with either greater gross benefits, lower costs of attendance, or more consumptive benefits.

The bundling of services presents opportunities for institutions of varying prestige levels to compete with each other. If more-prestigious institutions on average have higher expected gross benefits (e.g., a Bachelor's degree from Harvard will result in higher salaries than a Bachelor's degree from Valdosta State), then this provides an obvious advantage for prestigious institutions in competing for students. This does not, however, mean that less-prestigious institutions cannot successfully compete with more-prestigious ones. If less-prestigious institutions charge lower prices than more-prestigious ones, for example, then this may offset some of the lower utility students would receive from choosing the less-prestigious institution. Or less-prestigious institutions may offer students better extracurricular opportunities and/or locational attributes that enable them to provide more utility to students and therefore become more competitive with more-prestigious institutions.

Competition between different types of institutions is also facilitated by two additional factors. First, given that students often do not know the true price that they would have to pay at different institutions, they may end up applying to some colleges that are ultimately out of their price range. In particular, the fact that private institutions have long engaged in substantial price discounting through merit- and need-based scholarships may lead some prospective students to apply for admission in the hope of receiving enough financial aid to make attendance possible. Second, students usually apply to a range of institutions as there is no guarantee that they will be accepted by their top choice. This is different from most product markets where consumers know that they can acquire the good/service as long as they have the ability to pay for it. In contrast, higher education markets are more similar to markets for spouses, where both parties have to accept the other in order for a transaction to occur. As a result, students will normally apply to several institutions that differ in terms of prestige and selectivity. The University of Georgia, for example, may be both an "aspirational" choice for lower-ability students and a "safety school" for higher-ability students.

Universities in the same analytical market will compete with each other for inputs on the demand side – for intake students, resources (including faculty,

government funding, endowments, and other funding sources), capacity, and political influence – as well as on the supply side, for available classroom seats, graduating students, research output, athletic programs, and other services. Under such conditions of interdependence, what one institution does can result in a competitive reaction from another if they operate in the same market. If no such response occurs within a meaningful time period (which may be long in higher education markets), then the nonresponding institution must feel that it is not constrained by the institution that initiated the new strategy and thus feels it will not lose buyers. So, if the University of South Australia lowers its fees or makes its product (whatever that might be) more readily available, we would expect Indiana University to respond in kind only if the two universities were in the same market. Although institutions do compete with each other over geographical space, the extent of the competitive constraints will diminish with distance, if for no other reason than the fact that a student's search and transaction costs will increase with distance. Thus, even in Australia, it is likely that the University of South Australia, located in Adelaide, would not operate in the same market for the intake of undergraduate students as the University of Sydney, located some 1,500 km (950 miles) away. It would, however, compete for entering students with the two other universities in Adelaide.

With more than 4,000 degree-granting institutions from which to choose in the United States, as well as institutions in other nations, how can students begin to isolate the set of institutions that fall within their desired market? Students now have a range of tools that they can use to help identify institutions that fall within the market of which they are interested. The College Navigator (<http://nces.ed.gov/collegenavigator/>) is an online search engine created by the National Center for Education Statistics. Students can use the search engine to not only identify institutions that offer degrees in specific subject areas but also restrict their search to institutions within specific geographic spans, price ranges, and other criteria. Table 7.6 provides an illustration of how the College Navigator can help students identify the relevant market. In this example, the student lives in Athens, GA, and would like to pursue a Bachelor's degree in business. According to College Navigator, there are more than 500 institutions that offer a Bachelor's degree in business across the United States. If the student narrowed the search down to only institutions within 200 miles of Athens, the number of institutions in the market fell to 148. The student could continue to narrow down the scope of the market by restricting the search to institutions where the tuition was below \$25,000/year ($n=123$) and where the acceptance rate was also below 70% ($n=62$).

The growth of for-profit and distance education providers of higher education services introduces more complexity into the topic of markets. To illustrate, the University of Phoenix may move into a new geographic area and award degrees in the same subjects as regional private or public institutions. However, it is unlikely that the degrees from the University of Phoenix would be viewed as substitutable for degrees from Stanford or from a highly selective public university such as the University of Michigan by the students who are considering attending these prestigious resident campus institutions. At the same time, nontraditional students in the region may well consider the services to be substitutes. Thus, in this case, it would

Table 7.6 Example of market search results using College Navigator

Search	Criteria	Number of institutions meeting criteria
(A)	All institutions offering Bachelor's degree in business	$n = 500+$
(B)	Same as (A), but within 200 miles of Athens, GA	$n = 148$
(C)	Same as (B), but with tuition below \$25,000/year	$n = 123$
(D)	Same as (C), but with acceptance rate below 70%	$n = 62$

Notes: Data obtained from the College Navigator search engine (<http://nces.ed.gov/collegenavigator/>)

be a mistake for the regional public college to ignore the entry of the University of Phoenix into the market, but it would be a mistake of equal magnitude for the likes of Stanford to respond to the moves of the University of Phoenix. Clearly, given the purposive nature of market definition – where a market is defined by the nature of the reasons for examining it– there will rarely be one consistent or “right” definition of the relevant market for any one policy, antitrust, regulation, or commercial issue. The criteria to be used are arguable, and the empirical measurement techniques are debatable, such that it is rare, certainly in a contested legal situation, to reach agreement as to what the precise boundaries of the relevant market are for the issue in question (Church & Ware, 2000; Keyte & Stoll, 2004). But this does not refute the need to be aware that markets do exist and that their boundaries must be considered prior to creating or assessing policy or analyzing the behavior of buyers, sellers, or input suppliers in the relevant market.

It could be argued that this formal process of market definition is extremely difficult and unnecessary and is likely to lead to artificially or inaccurately defined markets that do not correctly reveal the true or relevant area of constraints. This leads to the proposition that markets be allowed to reveal themselves through the actions of suppliers and demanders. The analyst or observer should not seek to impose an artificial market construct that does not coincide with commercial or regulatory reality. Rather, the observations should be made of what institutions and consumers actually do – which other institutions are targeted by their conduct, which other institutions (both current as well as potential rivals) they respond to, and which customers they particularly seek to attract (by way of, e.g., advertising, sponsorships, trade fairs, product endorsements). This is a more commercially realistic way in which to identify the true area of close competition, rather than the more academic process of formally identifying the various market boundaries through economic measurements or through abstract thought processes relating to the measurement of demand-side and supply-side substitution possibilities.

The mere fact that a market has been defined through the use of objective economic processes (though reasonable economists, using the same objective evaluators, may still emerge with different market boundaries, depending on how they weight or interpret the results) does not mean that each institution and product assigned into the market is homogeneous. Far from it! Institutions in the same market could be big or small, use different technologies or marketing techniques, be

differently organized, or have different corporate goals. Within a market, there could be distinct hierarchies or groups of institutions defined by different organizational, operational, or size factors, yet all of which compete to sell products that are seen by buyers as either actually or potentially highly substitutable. Restaurants in a city provide a good example of this situation. Differences in cooking styles, seating capacities, ambiances, wine lists, price ranges, locations, and so on all mean that the restaurant market, if it exists in this broad characterization, might consist of many different strategic groups or submarkets, but they all seek to appeal to a wide range of diners and do compete, at least at the margin, especially within a given price bracket or food type or geographic span. To repeat an earlier point, if a state legislature decrees that credits earned at in-state community colleges are to be fully transferable to the state's research universities, then at least, for these courses and the students who take them, both types of institutions could be viewed as belonging to the same market.

Similarly, it can be difficult to use changes in prices in higher education to identify which colleges compete with each other. Institutions typically change their prices only once each year, and price changes can be affected by changes in state appropriations and other factors in addition to responses to competitors. Institutions have become much more sophisticated over time in using data on potential students as a way to identify who they compete with in their markets. Many colleges in the United States now have offices of "enrollment management" that are set up to find potential markets of students and analyze how to recruit them in light of competition from other institutions. Institutions may also exploit information from the Census Bureau using geocoding software to identify neighborhoods where the socioeconomic characteristics of families are consistent with the types of students that the institution seeks to attract.

Students can reveal the markets they are considering through their early indicators of demand for higher education. If a student applies to a group of five institutions, for example, then it suggests that these are the institutions that the student considers to be competitors for the service she is seeking. Similarly, given that students are usually required to submit standardized test scores when applying for admission to Bachelor's degree programs, they can reveal their initial choice set of institutions through the colleges to which they send their standardized test scores from either the Scholastic Aptitude Test (SAT) or the American College Testing (ACT) exam (Toutkoushian, 2001b). Institutions that share a large number of applicants or SAT score senders might therefore be thought of as competitors for students. It is now common for institutions to obtain such data and track information on those institutions with whom they compete most heavily for students.

To illustrate, Table 7.7 provides data on the overlap of SAT score submissions by high school seniors in the State of New Hampshire to a set of designated institutions in a particular year (1996). These high school seniors were at the point where they were considering pursuing either an Associate's degree or a Bachelor's degree; however, the majority of students were most likely interested in a Bachelor's degree given that they have taken the SAT and that the test is only required for Bachelor's degree programs in the region. The four columns correspond to the four public

Table 7.7 Overlap of SAT senders for New Hampshire students, 1996

Category	Institution	UNH-D	KSC	PSU	UNH-M
		(%)	(%)	(%)	(%)
New Hampshire public institutions	University of New Hampshire (Durham campus) – UNH-D	–	65	67	43
	Keene State College (KSC)	24	–	54	31
	Plymouth State University (PSU)	22	49	–	29
	University of New Hampshire (Manchester campus) – UNH-M	4	8	8	–
New Hampshire private institutions	Franklin Pierce College	2	6	5	6
	Dartmouth College	9	5	4	6
New England private institutions	Boston University	12	5	5	6
	Boston College	9	3	3	4
	Northeastern University	11	6	7	7
New England public institutions	University of Vermont	12	6	6	4
	University of Massachusetts	8	6	5	5

Data were obtained from the College Board

Note: Values represent the percentage of students who submitted their SAT scores to both institutions in 1996

institutions in the state with residential campuses: the University of New Hampshire's main campus at Durham (UNH-D), Keene State College (KSC), Plymouth State University (PSU), and the University of New Hampshire's branch campus at Manchester (UNH-M). Among these four institutions, UNH-D offers the fullest range of graduate degrees and is the most research intensive and prestigious. KSC and PSU focus on Bachelor's degree programs and a limited number of Master's degree programs. Finally, UNH-M specializes in Associate's and some Bachelor's degree programs.

For each of these institutions, we calculated the percentage of New Hampshire seniors who submitted their SAT scores to each institution as well a group of seven other institutions that are in close proximity to the four public institutions in New Hampshire. These other institutions are broken down into three groups: (1) private institutions in New Hampshire, (2) private institutions in New England, and (3) public flagship institutions in New England. The figure 65% in the first row of the column for KSC shows, for example, that 65% of the students who submitted their SAT scores to Keene State College also submitted their SAT scores to UNH-D.

Several interesting findings regarding competition among the institutions emerge from these data on SAT overlaps. Note first that despite the significant differences among the four public institutions in New Hampshire, they experience a high degree of overlap in SAT submissions, with approximately two-thirds of the SAT senders to the state colleges (KSC and PSU) also sending their test scores to the state's public flagship research institution (UNH-D). Similarly, there is a high degree of overlap between the two UNH campuses, even though UNH-M has a more limited range of degree programs as compared to the main campus in Durham. Even though UNH-D is considered to be a research-oriented institution, it shares more SAT senders

with the teaching-oriented public institutions in the state than it does with other research-oriented public institutions in the region such as the University of Vermont and the University of Massachusetts at Amherst. At the same time, UNH-D has more SAT overlap with the research-focused institutions in the region that is true for KSC, PSU, and UNH-M, as would be expected.

Policy Analysis and Markets in Higher Education

Finally, we end with some thoughts on the connection between properly defining markets in higher education and policy analysis. Higher education policies come in many forms, from state and federal laws and regulations to institution-specific initiatives. Because higher education markets by definition consist of IHE that directly compete with each other and are thus interconnected, policies that target one or more institutions in a market will likely have an influence on all of the other institutions within the same market.

Before embarking on any form of economic or policy analysis of market failure, behavior, incentives, inefficiencies, innovation, or restructuring, it is crucial to first ensure that all of the participants in the market have been correctly identified, including not only the rival sellers but also buyers, suppliers, and current or potential rivals to the incumbents. This involves problematic empirical issues such as identifying potential entrants, when they are likely to enter and at what scale, and identifying goods that are close enough substitutes in either demand or supply to constrain the operations of the institution in question and at what prices.

Markets can be defined too narrowly, in which case some competing institutions will be excluded from consideration, and the institutions assigned to a market will be thought to have more market power and fewer constraints on their behavior than is actually the case. If, on the other hand, markets are defined too broadly, then it is likely that they will be found to be more competitive than they really are and that policy action may be misdirected in the form of failing to act to remedy a deficiency in the market's performance. This problem of getting the breadth of market definition right applies to all three market dimensions.

Although, conceptually, a market is a simple economic construct – a collection of buyers and sellers of close substitute products – in practice, it can be difficult to define its boundaries with any great precision and without great controversy. But it is within markets that economic activity takes place, and it is this activity we want to be conducted to ensure the optimum allocation of resources, both private and public. Therefore, it is important that all those who seek to influence resource allocation in higher education – government policymakers, academics, university decision-makers – realize that a one-size-fits-all policy perspective might not produce the best results throughout the variety of distinct markets that constitute the higher education sector. For example, markets can only be shown to be “efficient” (reflecting an allocation of goods and services that provide the greatest benefits at the least cost) if potential like sellers and like buyers can be defined and the influences on them can be accurately identified.

In an overview such as this, we cannot hope to cover all of the issues that could arise in any empirical or policy situation that calls for market definition. We put forward the following checklist as illustrative of the kinds of practical problems that will confront researchers who need to define markets for postsecondary education:

- Start with the program, institution, or group that is the subject of the inquiry, keeping in mind the purpose of the inquiry.
- Seek to identify the closest substitute from the perspective of the relevant buyers or sellers and assess whether and by how much this constrains the actions of the original party. Keep adding rival institutions until no further substitution appears to be acceptable, such that a group of institutions has been identified that faces no effective constraints from those outside the group. In this process, it is essential to identify the nature and extent of the constraints that are being assessed.
- As part of this process, consider geographic substitution, taking into account the extra costs that might be involved.
- Take care to include in the assessment any constraints offered by potential entrants into the market, as long as this entry is currently a real enough threat to constrain the institution(s) in question.
- Consider also the influence of suppliers to the institution.

Market delineation is far from an exact science. It is frequently a matter of great contention in antitrust cases. But this does not obviate the need to provide the definition that best informs those who must make policy judgments about how best to shape the operation of the market through appropriate policy instruments and changes.

Concluding Thoughts

The concept of markets and competition between colleges and universities within markets is now a global phenomenon. As institutions struggle to acquire financial resources to compete in these markets, they will surely look to innovative ways of extending their market power and reaching new customers. This framework can be used to consider how higher education markets are likely to change in the future. For example, what will the role of research be in the future of higher education? We have seen a gradual ratcheting up of research activities at many postsecondary institutions in the United States as they search for ways to increase their prestige and ranking within the industry. A similar shift has occurred in higher education industries around the globe, as evidenced by the growth of international rankings schemes that focus on bibliometric measures of research output (Shin, Toutkoushian, & Teichler, 2011).

The fact that graduate markets have substantial fixed costs and high variable costs has served to limit the size of these markets. Nonetheless, research is a necessary component of educational services at the graduate degree levels and is likely to have benefits at the undergraduate level as well. Becker and Andrews (2004)

provided examples to show that higher education involves much more than the teaching of traditional doctrine. It is the academic inquiry that elevates higher education above mere training. They argued that at a research university, instruction has the potential to be enhanced as it can be made a part of an integrated and aggressive campaign of inquiry. Active researchers can engage students in the challenging ideas, questions, and methods of inquiry at the forefront of their disciplines, whereas docents can be expected only to teach that which they have been taught or learned from textbooks. They called attention to the fact that research is expensive and that public community colleges with no research mission have thrived under the belief that a faculty devoted to research is not essential to performing the less-expensive teaching function. A contextual updating of Gresham's law (inferior currency drives out superior currency) might suggest that the less-expensive educational practices of community colleges will force out the more expensive, full-time, tenured faculty members teaching at the research universities. As Becker and Andrews demonstrated, there is evidence of this happening with both public research and doctoral institutions increasing the proportions of both part-time and full-time faculty members with nontenure track appointments. Following the community college model, universities are increasingly looking to part-time and nontenure track docent-type appointments to teach in undergraduate baccalaureate programs. Unfortunately, Gresham's law in this context is just as deficient in assessing effects as it is for monetary policy.

What types of institutions appear to be best positioned to compete in higher education markets in the future? Clearly, those that have been successful at attaining prestige have been able to use this to generate excess demand for their services and in turn become even more prestigious and successful in higher education markets. Some less-prestigious institutions (mainly public) have achieved success through a combination of lower prices and better extracurricular opportunities and locational attributes. It is not hard to see, however, why the less-prestigious private institutions have had the most difficulty competing in markets in recent years. They cannot rely on the same level of donative resources as prestigious private institutions or state-supported public institutions. As a result, their prices tend to be high and the investment return lower than for many other suppliers in the market. At the same time, they still have to compete with other institutions for faculty.

Finally, the growth of the for-profit sector and accompanying distance education providers has raised questions with regard to how this will affect the markets for higher education. By allowing students to consume higher education services from many different locations, distance education providers can alter the geographic span of existing higher education markets. Berret (2012) reported on a Harvard University conference on teaching where Clayton M. Christensen, a professor of business administration at the Harvard Business School, described how new businesses often enter the bottom of a market and claim untapped customers whom they reach through some new technological advance. Eventually, they move up in their market and overtake the dominant player. He said that higher education once was immune to market forces until the spread of online learning, "which will allow lower-cost providers to extend into the higher reaches of the marketplace."

Given our understanding of markets, however, it is extremely difficult to envision how a provider such as the University of Phoenix with its open enrollment and for-profit mentality could ever move up in prestige to threaten highly selective institutions such as Harvard University. Despite the fact that online institutions may enjoy cost advantages over their more-prestigious counterparts and offer degree programs in similar subject areas, they will likely always compete in separate markets for the vast majority of customers. In particular, the hierarchical nature of Bachelor's degree markets and corresponding differences in investment returns have a strong effect on the specific markets where high-ability students choose to participate. Distance education services will also provide fewer academic support and student services than residential institutions and place less emphasis on consumptive benefits, which will limit their attractiveness to students in higher education markets.

It is our hope that this chapter is helpful in distinguishing between the many ways in which academics, policymakers, and stakeholders have applied the term "market" to higher education. Debate is certain to continue as to whether the application of business practices is beneficial or harmful to higher education. Nonetheless, it is crucial for all involved to understand that there are many different markets within the higher education industry and that it can be extremely challenging to identify precisely which institutions are in which markets.

Endnotes

1. The ideas presented in this chapter are extensions of some of the ideas presented in Becker and Round (2009).
2. As economists, we do not attempt to address the idea that there is "market space" for the various things produced by institutions of higher education as one might find in marketing courses offered by business schools but rather focus on the general concept of a market as the interaction of buyers and sellers as treated in an economics course.
3. Andrew S. Rosen is chief executive of Kaplan Inc., which is one of if not the largest for-profit postsecondary education providers in the world. Naomi Schaefer Rifey is the author of *The Faculty Lounges: And Other Reasons Why You Won't Get the College Education You Pay For* (2011).

References

- Anderson, M. (1992). *Impostors in the temple*. New York: Simon and Schuster.
- Arimoto, A. (1997). Market and higher education in Japan. *Higher Education Policy*, 10, 199–210.
- Astin, A. (1993). *What matters in college: Four critical years revisited*. San Francisco: Jossey-Bass.
- Bamberger, G., & Carlton, D. (1999). Antitrust and higher education: MIT financial aid. In J. Kwoka Jr. & L. White (Eds.), *The antitrust revolution: Economics, competition, and policy*. New York: Oxford University Press.
- Becker, W., & Andrews, M. (Eds.). (2004). *The scholarship of teaching and learning in higher education: Contributions of research universities*. Bloomington, IN: Indiana University Press.

- Becker, W., & Kennedy, P. (2006, January). The influence of teaching on research in economics. *Southern Economic Journal*, 72(3), 747–759.
- Becker, W., & Round, D. (2009). 'The' market for higher education: Does it really exist? (IZA Discussion Paper No. 4092). Available at SSRN: <http://ssrn.com/abstract=1373326>
- Berret, D. (2012, February 5). Harvard conference seeks to Jolt University Teaching, *The Chronicle of Higher Education*, <http://online.wsj.com/article/SB10001424052970204879004577110970031199712.html?KEYWORDS=The+University+of+Adam+Smith#printMode>
- Bok, D. (1986). *Higher learning*. Cambridge, MA: Harvard University Press.
- Bok, D. (2003). *Universities in the marketplace: The commercialization of higher education*. Princeton, NJ: Princeton University Press.
- Borden, V., & Bottrill, K. (1994). Performance indicators: History, definitions, and methods. *New Directions for Institutional Research*, 82, 5–22.
- Bound, J., Hershbein, B., & Long, B. (2009). Playing the admissions game: Student reactions to increasing college competition. *Journal of Economic Perspectives*, 23, 119–146.
- Breneman, D. (1981). Strategies for the 1980s. In J. Mingle (Ed.), *Challenges of retrenchment*. San Francisco: Jossey-Bass.
- Brewer, D., Gates, S., & Goldman, C. (2002). *In pursuit of prestige: Strategy and competition in U.S. higher education*. New Brunswick, NJ: Transaction Publishers.
- Brunner, J. (1993). Chiles higher education – Between market and state. *Higher Education*, 25, 35–43.
- Brunner, J. (1997). From state to market coordination: The Chilean case. *Higher Education Policy*, 10, 225–237.
- Carlson, D., & Shepherd, G. (1992). Cartel on campus: The economics and law of academic institutions' financial aid price-fixing. *Oregon Law Review*, 71, 563–629.
- Carlton, D., Bamberger, G., & Epstein, R. (1995). Antitrust and higher education: Was there a conspiracy to restrict financial aid? *The Rand Journal of Economics*, 26, 131–147.
- Cave, M., Hanney, S., & Kogan, M. (1991). *The use of performance indicators in higher education: A critical analysis of developing practice* (2nd ed.). London: Jessica Kingsley.
- Church, J., & Ware, R. (2000). *Industrial organization: A strategic approach*. Boston, MA: Irwin McGraw Hill.
- College Board. (2011). *Trends in college pricing 2011*. New York: The College Board. Paper downloaded on June 18, 2012, from http://trends.collegeboard.org/downloads/College_Pricing_2011.pdf
- Dale, S., & Krueger, A. (2002). Estimating the payoff to attending a more selective college: An application of selection on observables and unobservables. *Quarterly Journal of Economics*, 117, 1491–1527.
- Dill, D. (1997a). Markets and higher education: An introduction. *Higher Education Policy*, 10, 163–166.
- Dill, D. (1997b). Higher education markets and public policy. *Higher Education Policy*, 10, 167–185.
- Dill, D., & Soo, M. (2004). Transparency and quality in higher education markets. In P. Teixeira, B. Jongbloed, D. Dill, & A. Amaral (Eds.), *Markets in higher education: Rhetoric or reality* (pp. 61–85). Dordrecht, The Netherlands: Kluwer.
- Dill, D., & Sporn, B. (1995). The implications of a postindustrial environment for the university: An introduction. In D. Dill & B. Sporn (Eds.), *Emerging patterns of social demand and university reform: Through a glass darkly* (pp. 1–19). Oxford: Pergamon Press.
- Epple, D., Romano, R., & Sieg, H. (2006). Admission, tuition, and financial aid policies in the market for higher education. *Econometrica*, 74, 885–928.
- Fallows, J. (1990, March 1). Wake Up, America! *New York Review of Books*, 17–18.
- Friedman, M. (1955). The role of government in education. *Economics and the Public Interest*, 2, 85–107.
- Friedman, M. (1962). *Capitalism and freedom*. Chicago: University of Chicago Press.
- Friedman, T. (2005). *The world is flat: A brief history of the twenty-first century*. New York: Farrar, Strauss and Giroux.

- Geiger, R. (2004). Market coordination of higher education: The United States. In P. Teixeira, B. Jongbloed, D. Dill, & A. Amaral (Eds.), *Markets in higher education: Rhetoric or reality?* (pp. 161–183). Dordrecht, The Netherlands: Kluwer.
- Getz, M., & Siegfried, J. (1991). Costs and productivity in American colleges and universities. In C. Clotfelter, R. Ehrenberg, M. Getz, & J. Siegfried (Eds.), *Economic challenges in higher education, Part III* (pp. 259–392). Chicago: The University of Chicago Press.
- Gibbs, P. (2001). Higher education as a market: A problem or solution? *Studies in Higher Education*, 26, 85–94.
- Glenna, L., Lacy, W., Welsh, R., & Biscotti, D. (2007). University administrators, agricultural biotechnology, and academic capitalism: Defining the public good to promote university-industry relationships. *The Sociological Quarterly*, 48, 141–163.
- Glennerster, H. (1991). Quasi-markets for education? *The Economic Journal*, 101, 1268–1276.
- Guri-Rosenblit, S., Šebková, H., & Teichler, U. (2007). Massification and diversity of higher education systems: Interplay of complex dimensions. *Higher Education Policy*, 20, 373–389.
- Harman, G. (2006). Adjustment of Australian academics to the new commercial university environment. *Higher Education Policy*, 19, 153–172.
- Hayek, F. (1944). *The road to serfdom*. Chicago: The University of Chicago Press.
- Hayek, F. (1988). *The fatal conceit: The errors of socialism*. Chicago: The University of Chicago Press.
- Hayes, D., & Wynyard, R. (Eds.). (2002). *The McDonaldization of higher education*. Westport, CT: Bergin & Garvey.
- Hoxby, C. (1997, December). *How the changing market structure of U.S. higher education explains college tuition* (NBER Working Paper No. 6323). Cambridge, MA: National Bureau of Economic Research.
- Hoxby, C. (2009). The changing selectivity of American colleges. *Journal of Economic Perspectives*, 23, 95–118.
- Hoxby, C., & Long, B. (1999). *Explaining rising income and wage inequality among the college-educated* (NBER Working Paper No. 6873). Cambridge, MA: National Bureau of Economic Research.
- James, E. (1978). Product mix and cost disaggregation: A reinterpretation of the economics of higher education. *Journal of Human Resources*, 12, 157–186.
- James, E. (1986). Cross-subsidization in higher education: Does it prevent private choice and public policy? In D. Levy (Ed.), *Private education: Studies in choice and public policy* (pp. 237–257). New York: Oxford University Press.
- James, E., & Neuberger, E. (1981). The university department as a nonprofit labor cooperative. *Public Choice*, 36, 585–612.
- Jongbloed, B. (2003). Marketisation in higher education, Clark's triangle and the essential ingredients of markets. *Higher Education Quarterly*, 57, 110–135.
- Keyte, J., & Stoll, N. (2004). Markets? We don't need no stinking markets! The FTC and market definition. *The Antitrust Bulletin*, 49, 593–632.
- Kim, S., & Lee, J. (2006). Changing facets of Korean higher education: Market competition and the role of the state. *Higher Education*, 52, 557–587.
- Leslie, L., & Johnson, G. (1974). The market model and higher education. *Journal of Higher Education*, 45, 1–20.
- Leslie, L., & Slaughter, S. (1997). The development and current status of market mechanisms in United States postsecondary education. *Higher Education Policy*, 10, 239–252.
- Lieberman, M., & Hall, R. (2000). *Introduction to economics*. Cincinnati, OH: South-Western Publishing Company.
- Marginson, S. (1997). Competition and contestability in Australian higher education, 1987–1997. *Australian Universities Review*, 40, 5–14.
- Marshall, A. (1920). *Principles of economics* (8th ed.). New York: Macmillan.
- Massy, W. (1989). *A strategy for productivity improvements in college and university academic departments*. Stanford, CA: Stanford University.

- Massy, W. (2004). Markets in higher education: Do they promote internal efficiency? In P. Teixeira, B. Jongbloed, D. Dill, & A. Amaral (Eds.), *Markets in Higher Education: Rhetoric or Reality?* Dordrecht, The Netherlands: Kluwer Publishers.
- Mazzarol, T., & Soutar, G. (2001). *The global market for higher education: Sustainable competitive strategies for the new millennium*. Cheltenham, UK: Edward Elgar.
- McEachern, W. (1994). *Microeconomics: A contemporary introduction* (3rd ed.). Cincinnati, OH: South-Western Publishing Company.
- McMahon, W. (2009). *Higher learning, greater good: The private and social benefits of higher education*. Baltimore: Johns Hopkins University Press.
- McPherson, M., & Shapiro, M. (1998). *The student aid game: Meeting need and rewarding talent in American higher education*. Princeton, NJ: Princeton University Press.
- Meek, L., & Wood, F. (1997). The market as a new steering strategy for Australian higher education. *Higher Education Policy*, 10, 253–274.
- Mora, J. (1997). Market trends in Spanish higher education. *Higher Education Policy*, 10, 187–198.
- National Center for Education Statistics. (2011). *Digest of education statistics 2011*. Washington, DC: Institute of Education Sciences.
- Netz, J. (1999, March). *Non-profits and Price-fixing: The case of the Ivy League*. Retrieved March 3, 2008, from the Applied Economics Consulting Web site: <http://www.applecon.com/publications/ivy.pdf>
- Pugsley, L. (2004). *The university challenge: Higher education markets and social stratification*. Burlington, VT: Ashgate Publishing Company.
- Reich, R. (2004, March 24). Higher Education ‘Market’ Warning. *The Higher Education Policy Institute Lecture*. Retrieved March 3, 2008, from BBC News at <http://news.bbc.co.uk/1/hi/education/3564531.stm#transcript>
- Rhoades, G., & Slaughter, S. (1997). Academic capitalism, managed professionals, and supply-side higher education. *Social Text*, 51, 9–38.
- Rhoades, G., & Slaughter, S. (2004). *Academic capitalism and the new economy*. Baltimore: John Hopkins University Press.
- Rifey, N. (2011). *The faculty lounges: And other reasons why you won't get the college education you pay for*. Chicago: Ivan R. Dee.
- Rifey, N. (2012, February 6). The University of Adam Smith. *Wall Street Journal*. <http://online.wsj.com/article/SB10001424052970204879004577110970031199712.html?KEYWORDS=The+University+of+Adam+Smith>
- Ritzer, G. (1998). *The McDonaldisation thesis: Explorations and extensions*. London/Thousand Oaks, CA: Sage.
- Rohlen, T. (1983). *Japan's high schools*. Berkeley, CA: University of California Press.
- Romer, P. (1990). Endogenous technological growth. *Journal of Political Economy*, 99, S71–S102.
- Rosen, A. (2011). *Change.edu: Rebooting for the new talent economy*. New York: Kaplan Publishing.
- Rothschild, M., & White, L. (1993). The university in the marketplace: Some insights and some puzzles. In C. Clotfelter & M. Rothschild (Eds.), *Studies of supply and demand in higher education* (pp. 11–42). Chicago: The University of Chicago Press.
- Rothschild, M., & White, L. (1995). The analytics of the pricing of higher education and other services in which the customers and inputs. *Journal of Political Economy*, 103, 573–586.
- Rozada, M., & Menendez, A. (2002). Public university in Argentina: Subsidizing the rich? *Economics of Education Review*, 21, 341–351.
- Salop, S., & White, L. (1991). Antitrust goes to college. *Journal of Economic Perspectives*, 5, 193–202.
- Scheffman, D., & Spiller, P. (1987). Geographic market definitions under the U.S. Department of Justice merger guidelines. *Journal of Law and Economics*, 30, 123–147.
- Selingo, J. (2006, August 30). The Commission's Report: Landmark or Footnote Charles Miller (Guest). *The Chronicle of Higher Education's online Live Discussion*. <http://web.archive.org/web/20090210073258/http://chronicle.com/colloquy/2006/09/spellings/>

- Shin, J., Toutkoushian, R., & Teichler, U. (Eds.). (2011). *University rankings: Theoretical basis, methodology and impacts on global higher education*. Dordrecht, The Netherlands: Springer.
- Slaughter, S., & Leslie, L. (1997). *Academic capitalism: Politics, policies and the entrepreneurial university*. Baltimore: John Hopkins University Press.
- Slaughter, S., & Rhoades, G. (2009). *Academic capitalism and the new economy: Markets, state, and higher education*. Baltimore: Johns Hopkins University Press.
- Smith, A. (1776). *The wealth of nations*. New York: Barnes & Noble Books.
- Stiglitz, J. (1987). The cause and consequences of the dependence of quality and price. *Journal of Economic Literature*, 25, 1–48.
- Teichler, U. (1998). Massification: A challenge for institutions of higher education. *Tertiary Education and Management*, 4, 17–27.
- Teixeira, P., Jongboed, B., Amaral, A., & Dill, D. (2004). Introduction. In P. Teixeira, B. Jongboed, D. Dill, & A. Amaral (Eds.), *Markets in higher education: Rhetoric or reality?* Dordrecht, The Netherlands: Kluwer.
- Teixeira, P., Jongbloed, B., Dill, D., & Amaral, A. (Eds.). (2004). *Markets in higher education: Rhetoric or reality?* Dordrecht, The Netherlands: Kluwer.
- The Carnegie Commission on Higher Education. (1973). *The purposes and performance of higher education in the United States: Approaching the year 2000*. New York: McGraw-Hill.
- Toutkoushian, R. (2001a). Trends in revenues and expenditures in public and private higher education. In M. Paulsen & J. Smart (Eds.), *The finance of higher education: Theory, research, policy & practice* (pp. 11–38). New York: Agathon Press.
- Toutkoushian, R. (2001b). Do parental income and educational attainment affect the initial choices of New Hampshire's college-bound students? *Economics of Education Review*, 20, 245–262.
- Toutkoushian, R., & Danielson, C. (2002). Using performance indicators to evaluate decentralized budgeting systems and institutional performance. In D. Priest, W. Becker, D. Hossler, & E. St. John (Eds.), *Incentive-based budgeting systems in public universities* (pp. 205–226). Northampton, MA: Edward Elgar Publishing.
- van Vught, F. (1997). Combining planning and the market: An analysis of the government strategy towards higher education in the Netherlands. *Higher Education Policy*, 10, 211–224.
- Veblen, T. (1918). *The higher learning in America: A memorandum on the conduct of universities by business men*. New York: B. W. Huebsch.
- Williams, G. (1997). The market route to mass higher education: British experience 1979–1996. *Higher Education Policy*, 10, 275–289.
- Winston, G. (1997). Why can't a college be more like a firm? *Change*, 29(5), 32–38.
- Winston, G. (1999). Subsidies, hierarchy and peers: The awkward economics of higher education. *Journal of Economic Perspectives*, 13, 13–36.
- Winston, G. (2000). *Economic stratification and hierarchy among US colleges and universities* (Discussion Paper 58, Williams Project on the Economics of Higher Education). Williamstown, MA; Williams College.
- Winston, G. (2003). *Toward a theory of tuition: Prices, peer wages, and competition in higher education* (Discussion Paper No. 65). Williamstown, MA: Williams Project on the Economics of Williams College. <http://sites.williams.edu/wpehe/files/2011/06/DP-65.pdf>
- Yonezawa, A. (1998). Further privatization in Japanese higher education? *International Higher Education*, 13, 20–22.
- Yorke, M. (2003). Formative assessment in higher education: Moves towards theory and the enhancement of pedagogic practice. *Higher Education*, 45, 477–501.
- Zemsky, R., Shaman, S., & Ianozzi, M. (1997, November/December). In search of strategic perspective: A tool for mapping the market in postsecondary education. *Change*, 29, 23–38.
- Zemsky, R., Shaman, S., & Schapiro, D. (Eds.) (2001). *Higher education as competitive enterprise: When markets matter* (New Directions for Institutional Research, Number 111). San Francisco: Jossey-Bass, Inc.

Chapter 8

Learning Strategies, Study Skills, and Self-Regulated Learning in Postsecondary Education

Philip H. Winne

I have never visited a college or university bookstore that did not stock a collection of books recommending learning strategies that the books' authors claimed could boost learners' achievement and satisfaction in their postsecondary studies. A nonscientific internet survey of 50 North American colleges, universities, and technical schools revealed that every one offered some form of institutional support for learners to improve their methods for studying and learning. I believe it is valid to infer that learning strategies may be as prevalent on today's physical and virtual campuses as the proverbial "101s" in English, calculus, and psychology.

A decade and a half ago, one hypothesis for increased attention to learning strategies and study skills was, whereas postsecondary institutions previously could afford to rigorously screen and selectively admit learners, the pressures of recent major budget cuts are now pushing them to enroll learners less prepared for the demands of postsecondary studies (Hadwin & Winne, 1996, p. 692). In the context of today's general press for nearly universal access to postsecondary education and jurisdictions' attempts to meet that demand, this conjecture may be even more valid.

Another reason may bolster justifications for ramping up services to improve learning strategies and study skills. It is commonly held that graduates of today's postsecondary institutions must be prepared to cope with an explosion of information if they are to contribute productively to an economy that is becoming ever more dependent on the latest – as in, an hour ago – updates to knowledge. In this context, and in anticipation of (or anxiety about) entirely new kinds and forms of information that may be necessary to achieve happiness and prosperity, skills for learning are deemed essential.

I agree with these views. But it is important that enthusiasm be bolstered by evidence that speaks to questions about whether study tactics and learning strategies

P.H. Winne, Ph.D. (✉)

Faculty of Education, Simon Fraser University, Burnaby, BC V5A 1S6, Canada
e-mail: winne@sfu.ca

really help learners learn more and more deeply. If they do, what does sound empirical research suggest needs attention to help learners succeed?

Before investigating data that bear on answers to these questions, I provide background about what learning strategies and study skills are, plus information that contextualizes the review of research that follows. I also examine issues that affect the dependability of findings generated by research.

Learning Strategies, Study Skills, and Self-Regulated Learning

Definitions of learning strategies abound. Weinstein, Husman and Dierking (2000, p. 227) offered a very broad account of learning strategies as “any thoughts, behaviors, beliefs or emotions that facilitate the acquisition, understanding or later transfer of new knowledge and skills.” Alexander, Graham and Harris (1998) identified six attributes of learning strategies. First, strategies are procedural, “how to” knowledge that ranges over a continuum from unvarying, step-by-step methods to flexible, heuristic guidelines about what to do to learn. Second, learning strategies are designed to accomplish a goal, a particular purpose that is yet to be achieved, such as memorizing the cranial nerves or evaluating the validity of an argument. Third, strategies require effort as measured by time, the learner’s mobilization of cognitive resources (e.g., mentally imaging a force diagram) and physical effort (e.g., making a trip to the library to check out a reserved book). Fourth, learners must apply will to enact strategies. Fifth and sixth, to qualify as a strategy according to Alexander et al., what the learner does must enhance performance and it should be a key ingredient (along with critical resources, such as prior knowledge and motivation) in achieving the learner’s goals.

My view (Hadwin & Winne, 2012) of learning strategies brings forward several other important features, namely, that (a) a learner cognitively and possibly physically manipulates information (b) selected from all the information assigned or available (in the environment plus knowledge the learner can recall or infer), (c) sometimes according to a timetable or schedule, (d) in a manner that is not intrinsic to the subject studied (e) with an intention (a goal) to improve learning and possibly other psychological characteristics (e.g., motivation) compared to results that would be achieved if the strategy or tactic was not applied. I illustrate and elaborate these features using an everyday example: highlighting.

When a learner highlights selected material, the colored mark traces otherwise unobservable cognition (Winne, 1982). In highlighting, the learner monitors information in a print or electronic medium, judging whether it meets particular standards, e.g., that it might be tested or needs to be explained. When the learner identifies information judged to satisfy these standards, the learner chooses to mark it with a highlight rather than manipulating the information in some other way, e.g., writing a paraphrase as a note or bookmarking a web page. Learners highlight because they believe it has benefits. Some learners possibly believe highlighting rehearses information and that rehearsing improves learning. Other

learners specifically don't intend to learn while highlighting. They believe review at a later time will be more efficient because highlights quickly guide them to information they previously judged might be tested. Regardless of the particular standards used and benefits forecast for highlighting, it is a metacognitive activity. It involves monitoring qualities of information beyond exactly what it means as well as products of cognition – what the highlighted material is for – to gauge fit to standards. Highlighting also involves metacognitive control in the sense of choosing a particular method for acting – highlighting selected information versus other possibilities, such as dog-earing a page – based on results generated by metacognitive monitoring (Flavell, 1979).

Study tactics like highlighting can be characterized in a format called a production which is represented as an IF–THEN rule: IF information seems like it might be tested (or merits further exploration or satisfies other standards the learner uses to monitor information being studied), THEN highlight it. When learners coordinate multiple tactics such as highlighting, annotating, and tagging (e.g., with colored adhesive plastic tabs or using a tag tool in software), they organize into a strategy particular selections from a tool kit of individual study skills. Strategies involve considerations about costs and benefits of alternatives for studying, extending the IF–THEN production to a format of IF–THEN–ELSE. When learners monitor features of tactics and composites of tactics that are strategies for the purpose of improving the effectiveness or efficiency of studying, they engage in self-regulated learning (SRL; Winne, 2011). SRL is hypothesized to be a key to success as a lifelong learner.

Self-Regulated Learning

Winne and Hadwin (1998; Winne, 2011; see also Hadwin & Winne, 2012) proposed a model of SRL specifically keyed to studying activities like those that postsecondary learners undertake. The model describes four phases with two explicit qualifications. First, while work often proceeds in order of the phases, learners are free to shift from phase to phase at any point. Second, products generated in any phase may provide new information for work carried out in another phase. These qualifications provide an account that is flexible and recursive.

The first phase in Winne and Hadwin's model of SRL is where learners build perceptions about features of assigned task(s) or tasks they design for themselves. Grounded in (a) memories about how they have worked in the past, (b) characteristics of their current situation along with (c) self-knowledge and (d) knowledge of the domain they are studying, learners construct an understanding of their task. In this phase, learners also identify resources and constraints that might have bearing on their work. Some of these resources and constraints are personal attributes, such as interest and estimates of competence (efficacy). Developing accurate perceptions of what the task affords and of accurately estimating one's profile of personal characteristics that may affect work on the task are key elements of learning skills for postsecondary students.

Consider this example. Every week in Basic Statistics, students receive a brief description of a theory, a set of fictitious data, and an account of methods used to generate those data. Their assignment is to analyze the data and author a two- to three-page report that addresses the hypothesis with a focus on (a) describing choices made in analyzing the data and (b) warranting interpretations of results. Riley judges he took thorough notes in class this week and recalls that, when he worked on last week's assignment, he found a Web site that provided a very helpful step-by-step example analogous to the analysis he had carried out. He also recollects becoming rather frustrated at points in his work and that a bit of positive self-talk was a good antidote.

In the second phase of SRL, learners set goals and devise plans for studying that they forecast will achieve those goals. Goals are critical to SRL. Without a goal, there is no basis for choosing to regulate studying in any particular way(s). Goals provide standards learners can use to monitor progress and success (Locke & Latham, 1990). Having set a goal, the learner then builds a plan for reaching it. To highlight potential problems in studying that learners may face, Winne and Hadwin's model of SRL separates two aspects that other models typically treat as one: (a) misunderstanding the task and (b) misconstruing how to approach the task they perceive.

Riley intends to ace this week's assignment. He infers he must at least address what the instructor requires. So, he reviews comments his instructor made about last week's assignment and develops a checklist of features that should be addressed in this week's report. He'll use this checklist to "score" his draft paper for completeness. Riley's second goal is to really understand this week's method for analyzing data. He decides to modify last week's tack – after finding an analogous worked example in the Internet, he'll try to generate an explanation for each step in the example. Then, he'll cross-check his explanation for each step against his notes. If he identifies weak parts or omissions, which could be vexing, he'll remind himself to relax and try to talk himself through the process of developing a better explanation.

Phase 3 of the Winne–Hadwin model of SRL is where learners carry out work on the task *per se*. Here, they put specific tactics and strategies into action, and with varying intensity and accuracy, they monitor the immediate results of their activities. This is the phase that most learners describe when asked about "studying."

Riley has completed most of the assignment but judges he can't explain why his analysis seems "off." His notes don't clarify this issue, so after, reminding himself that he can figure this out if he works at it, he tries two adjustments. First, he consults the online help available in the software he uses to analyze data. That resolves some of his confusion but not all. Next, he chats online with his friend, Melissa. Together, they figure out that Riley didn't examine a relevant diagnostic statistic that will reveal whether an assumption was met for the analytic method he chose.

The fourth phase of SRL involves deliberately evaluating success in reaching goals and hypothesizing whether adaptations to studying methods might be appropriate. This large-scale adaptation is the critical reflective component in SRL that

spans two arenas: (a) responding to challenges, shortcomings, and failures in the domain that a learner studies and (b) improving current learning skills. Being a productive self-regulating learner involves more than merely choosing a “right” strategy. Productive SRL is fundamentally about continuously improving one’s study tactics and learning strategies. This requires systematically experimenting with learning (Winne, 1997, 2010a). In this sense, successful SRL makes two requirements of learners: They must have and apply skills for researching their learning and they must have access to “data” that is useful in this work.

Riley has checked his paper to gauge how well it matches the instructor’s scoring rubric. Now, he reconsiders his overall approach to this week’s assignment. He decides to make two changes next week. First, he’ll collaborate with Melissa at step one. Together, they’ll review class notes about assumptions involved for a particular approach to analyzing data. As well, after each has independently drafted their report, they’ll swap papers to critique one another’s work using a mutually developed checklist. One focus will be whether assumptions were tested and how statistics that diagnose assumptions shape interpretations of results.

A Student COPES with a Task

Winne (1997) proposed that each phase of SRL can be described in terms of a fundamental cognitive architecture called COPES: conditions, operations, products, evaluations, and standards. Conditions refer to features of a task’s context that may influence students’ work. External or environmental conditions are factors such as time available, guidelines provided by a professor or textbook, and opportunity to access feedback. Internal conditions are characteristics of the learner such as expertise in the subject being studied, confidence, and a learner’s tool kit of learning strategies. Operations are cognitive manipulations of information that create mental products. Winne (2001) postulated a set of five primitive operations: searching, monitoring, assembling, rehearsing, and translating (SMART). Products are cognitive, affective, or motivational results that are generated when learners carry out operations in a phase of SRL. Because the products in one phase of SRL can create conditions for other phases, the model allows that SRL is adaptive at very fine grain sizes and has a “memory.” Evaluations are judgments learners make about products based on standards they use to evaluate products.

By modeling SRL in the four phases, previously described, where each phase has a common COPES architecture, everyday academic tasks are dissected into “mini tasks” corresponding to each phase of the model. To develop skills for learning as they experiment with options in each of the phases of working on tasks, learners must strive to systematically detect difficulties as they arise or by recalling prior episodes of study. Detecting problems is not sufficient, however. Learners also need options for operations that generate products in each phase of SRL. Without options – a tool kit of study tactics and learning strategies – there is little to regulate.

Researching Study Tactics, Learning Strategies, and SRL

Research on study tactics, learning strategies, and SRL (hereafter TS&SRL) can be classified in a variety of ways. For purposes of this chapter, I devote attention to methods by which information about TS&SRL is gathered. I then address issues I judge are key in research on TS&SRL.

Gathering Data About Tactics, Strategies, and SRL

By far, the most prominent method used to gather data about TS&SRL is to ask learners for descriptions. Two formats encompass practically all the specific variations of this method: questionnaires and think aloud protocols (Winne & Perry, 2000; Winne, Zhou, & Egan, 2011).

Questionnaires

The typical self-report questionnaire provides respondents with a brief and often general context relative to which responses to items are rated on an ordinal Likert scale. One prominent questionnaire is the *Motivated Strategies for Learning Questionnaire* (MSLQ; Pintrich, Smith, García, & McKeachie, 1993). It offers this instruction to respondents: “Please rate the following items based on your behavior in this class. Your rating should be on a 7-point scale ranging from ‘not at all true of me’ to ‘very true of me’.” Some illustrative items on the MSLQ are the following: *When studying for this course I try to determine which concepts I don’t understand well. When I study for this course, I write brief summaries of the main ideas from the readings and my class notes. I ask the instructor to clarify concepts I don’t understand well. I make sure that I keep up with the weekly readings and assignments for this course.*

Subscale scores for the MSLQ are formed by summing responses to 50 items (out of 81 total on the instrument) segmented into nonoverlapping sets of 3 to 12 items, then calculating the average response value for the set of items to form a subscale score. Subscales are titled: rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment management, effort regulation, peer learning, and help seeking.

A second highly cited self-report instrument is the *Learning and Study Strategies Inventory* (LASSI; Weinstein, Schulte, & Palmer, 1987). According to its publisher, the LASSI is used by 2274 secondary and postsecondary institutions (www.hhpublishing.com/_assessments/LASSI/ retrieved 2012 March 27 14:33). Seven of the LASSI’s 10 subscales address learning skills: time management, concentration, information processing, selecting main ideas, study aids, self testing, and test strategies. No context is given for responses that learners record on a 5-point

scale ranging from “not at all typical of me” to “very much typical of me.” Sample items are the following: *I find that during lectures I think of other things and don’t really listen to what is being said. I translate what I am studying into my own words. Often when studying I seem to get lost in details and can’t see the forest for the trees. I use special helps, such as italics and headings, that are in my textbooks.*

Several shortcomings and challenges can be noted when using responses from self-report questionnaires to describe learners’ TS&SRL (Winne et al., 2011; see also Tourangeau, Rips, & Rasinski, 2000; Winne, 2010b; Winne & Perry, 2000). The following is adapted from Winne et al. (2011, pp. 90–91).

First, a response to an item on a self-report scale describes a static state of TS&SRL. Each response represents the tactic or strategy as if it never varies. In contrast, TS&SRL “in action” is a dynamic process that is sensitive to unfolding conditions as a learner works through an assignment. For example, in a reading assignment, a learner may systematically change standards for highlighting information as understanding develops about the topic being studied.

Setting aside concerns for how learning changes over even brief spans of time, second, there is considerable opportunity for error to intrude on a learner’s responses to self-report questionnaire items. Human memory is imperfect in several ways. People invent memories to fill gaps using schemas that represent what is characteristic of a situation. They inaccurately estimate qualities of experience, such as the frequency of events, particularly when a few unrepresentative events are salient. People likely bias descriptions of a “usual” situation because they do not review the entire scope of relevant experience. Together, these properties of memory can mask, even from the learner, what is the case about a study tactic or strategy that is the subject of a given TS&SRL item.

Third, response scales learners must use to declare how they view or apply TS&SRL almost certainly are interpreted differently by different individuals. What one learner means by “somewhat true/typical of me” may be quite different from what other learners interpret about that phrase. This generates noise that obscures genuine individual signals when respondents’ replies are averaged, as would be done in analyzing data from an experiment or evaluating the effects of a workshop.

Fourth, learners can hold rather different interpretations of a TS&SRL variable named in an item. A “brief summary” for one learner can be quite different from another’s with respect to length and the degree of “overlap” it has with the original material. “Using concept maps” (a node-link diagram of information) to translate information from a text or a movie has different effects depending on whether a learner views a map created by the instructor versus generating it firsthand (see Nesbit & Adesope, 2006). When the meanings of items differ, the validity of interpretations about what responses mean is undermined.

Finally, self-report questionnaires may create descriptions that are fictitious. This can happen in two ways. First, if learners feel social pressure to respond to items even when they judge the item is not relevant, responses are invalid reflections of learners’ beliefs or judgments. Second, learners can easily misinterpret researchers’ intent about an item such that their responses generated are inventions relative to the topic an item is intended to address (Karabenick et al., 2007).

Think Aloud Protocols

Partly to compensate for some shortcomings of fixed-item self-report questionnaires, researchers investigating TS&SRL often invite learners to think aloud about how they study while they study. A common instruction is “As you study, please describe what you are doing by thinking aloud. I [the experimenter] may remind you to talk if you have not thought aloud for awhile.” Learners’ utterances are commonly recorded, subsequently transcribed, and then analyzed to identify common groups or clusters of events that, more or less, match subscales such as those previously described for self-report questionnaires.

Benefits of a think aloud protocol include that responses are generated based on the learner’s perceptions of conditions at hand in a task, and changes in the learner’s use of tactics and configuration of learning strategies can be identified over time and changes in conditions. On the downside, representativeness of responses is suspect because it cannot be guaranteed that a learner describes every instance where tactics and strategies are applied. That researchers believe it necessary to prompt thinking aloud acknowledges this issue. Regrettably, it is not possible to estimate either the nature or degree to which learners’ reports are complete or unbiased. A further complication is that, because learners use their own words to describe TS&SRL, researchers are challenged to decide whether different learner’s responses refer to similar or different activities.

Traces

Traces are data a learner generates in the normal course of studying. Winne (1982) introduced traces as a supplement to other forms of data about cognition, motivation, and TS&SRL. He argued that traces provide sturdier grounds for validating interpretations about how learners study. Highlighting, which was introduced earlier, is illustrative. When a learner highlights, there are strong grounds for inferring that behavior signals (a) metacognitive monitoring of information against specific standards, which is manifested in selections of text that are highlighted, and (b) motivation to exercise metacognitive control that produces highlights.

Traces have several benefits relative to questionnaire responses and data generated by a think aloud protocol. First, learners are free to engage as they see fit in behavior that traces a feature of TS&SRL. There is no social pressure to respond to a questionnaire item. Learners do not need to split attention between studying and expressing inner thoughts, as in a think aloud situation. Traces of learners’ engagements record when they choose a tactic, providing one-to-one correspondence with their thinking. If it is possible to record the context of each trace, as might be done with video or software logs, this affords as full a representation of IF–THEN features of TS&SRL that are available to an observer without asking a learner to think aloud.

A second advantage of traces is that, because learners cannot forget to trace in the same sense as they may forget prior experiences or forget to think aloud, the sampling fraction of cognitive activity reflected in traces is 100%. Whenever learners

judge it appropriate to behave, the trace they generate corresponds to their perception that a particular tactic is appropriate and “worth the effort” at that point. This strength of traces also reveals a drawback – traces cannot indicate by their absence when or why learners choose not to engage in a particular expression of TS&SRL. A think aloud protocol is more appropriate for this case provided that learners dependably describe such cases.

A second drawback to traces is that researchers still must interpret them. For example, while some cognitive elements of highlighting seem unequivocal, it is not clear why a learner chooses to highlight. In some cases, such as highlighting, the stretch to infer the meaning of a trace can be shortened considerably. For example, in a software-studying environment Winne and colleagues developed, called nStudy (Beaudoin & Winne, 2009; Winne & Hadwin, *in press*), learners can attach words to differently colored highlights that express the standards (or purposes) for marking text. This transforms one undifferentiated highlight into a collection of differentiated tags, e.g., “review this,” “explore further,” and “evidence pro.” Or, when learners repeatedly use a disciplinary term (e.g., “supply and demand” or “greenhouse gas”) in notes, each use of that term traces an instance of rehearsing the meaning of the term and assembling it with a context represented by the semantic content of the note.

Issues Bearing on Interpreting Research About TS&SRL

There is no shortage of issues to consider when weighing the appropriateness of measurements used to generate data, the research designs used to gather data, analyses of data, and validly interpreting findings of analyses in research on TS&SRL (e.g., for general discussions, see Shadish, Cook, & Campbell, 2002; Shavelson & Towne, 2002). For purposes of this chapter, I focus on major but selective issues.

Context

As introduced earlier, an abstract model for a study tactic is an IF–THEN rule. What a learner does, the action represented by a THEN, intrinsically pivots on the context a learner perceives, the IF(s). Data about TS&SRL rarely capture a full representation of context. When learners describe “how true of me” a statement is in a self-report survey or when they generate a trace, it is almost guaranteed that a researcher cannot know fully and accurately what the learner has in mind about context. A common approach to addressing this problem is to aggregate self-report responses, arithmetically by averaging or qualitatively by identifying a theme. This may compound the problem if it levels features of contexts that genuinely affect how a learner perceives and acts. To the extent that context matters, research about TS&SRL will entail risky generalizations.

Control

A researcher strives to control variables for purposes of isolating or removing the influence of nuisance factors that cause differences in a focal variable's status, predictive value, or role as a cause. In research on TS&SRL, control is most often exercised in one or both of two ways.

First, samples are described and sometimes partitioned on the basis of variables the researcher deems to be extraneous to a focal question under investigation. For instance, a sample participating in research might be described as "attending a small, liberal arts university in the Midwest" or "2nd-year students." When such variables are named *a priori*, the researcher is tacitly proposing that the variable is a cause of variance in the outcome being researched. Thus, if that variable had a different value – e.g., the setting was a technical college in the Northeast or students were 1st-year – results would vary. *Per se*, this is not a fault. What is often faulty, however, is that there is minimal or no research evidence that these variables actually are causal factors that affect the outcome variable. Therefore, unless these variables themselves are investigated in the research, attempts to generalize findings beyond the people and settings of a particular study are inherently undermined because factors treated as causes are not causes (see Borsboom, Mellenbergh, & van Heerden, 2003).

Second, statistical methods, such as analysis of covariance and multiple regression, are commonly used to numerically partial out variance that a "nuisance" factor contributes to a focal or outcome variable. For example, scores on postsecondary entrance examinations (e.g., ACT or SAT) or learners' motivation are used to compute statistically residualized scores on an outcome such as grade point average (GPA). The mathematics of such manipulations are not an issue provided that care is taken to assure certain statistical properties (e.g., that the relation is linear). What is faulty is when researchers overlook the fact that they have augmented the operational definition of the outcome. Any effects observed after analyzing such residualized scores are about the residualized scores, not the raw scores. Because of this, interpretations of effects found in a study should be framed in terms of the outcome as it was residualized, not the outcome as initially measured. For example, if SAT is residualized on motivation, results should be cast in terms of "SAT as residualized to eliminate effects of motivation" rather than raw SAT. Because the construct represented by residualized scores is not the same construct as represented by raw scores, interpretations of residualized variables can be skewed (Winne, 1983).

Reliability

An axiom that underlies the view that learners are self-regulating is that they are agents. Agents exercise "ability to control their actions and, through them, events in the external world" (Haggard & Tsakiris, 2009, p. 242). This fundamental human quality has a profound implication for researching TS&SRL and for attempts to support learners: No matter what a learner describes about TS&SRL

at a particular moment or how a researcher or instructor intervenes to influence TS&SRL, learners can change their engagements in learning at will. This is not merely a matter of motivation nor one mainly about one's conception of an aptitude as the capacity to respond shaped by a dynamically changing system (cf. Corno et al., 2001). The issue is that it is very challenging to forecast accurately what learners will do in a particular situation because "they are in charge." Moreover, to the extent that learners engage in SRL, which means they exercise agency, it should be expected that history will likely be only a modest predictor of observations in the present or the future.

The challenge of relying on history to predict the present or future is further complicated. There is very little research on the degree to which learners can reliably report how they study in the present or on the extent to which their actual studying activities correspond to models that researchers suggest are effective. At least two studies indicate that learners are not accurate reporters of how they study (Winne & Jamieson-Noel, 2002; Zhou & Winne, 2012). As well, there is evidence that learners don't study very effectively when the standard for effective studying is a model derived from research (Winne & Jamieson-Noel, 2003). There are at least two implications of these findings. First, data learners report about how they study may not reliably indicate how they actually studied, even if context does not vary. Second, learners engaged in programs of personal research to improve learning, i.e., learners engaged in SRL, might profit from (a) feedback that accurately represents how they actually studied and (b) information about tactics and strategies that might be more effective than those they actually used.

Summary of Methods Used in Research on TS&SRL

Research on TS&SRL is not unique in facing challenges. My scan of issues is necessarily brief but significant. To the extent that policy makers and postsecondary staff intend to make use of research findings, they need to recognize what may prudently be expected in light of these challenges. I am strongly of the view that ignoring research is irresponsible. But, I hold it also is naïve to blithely expect that research findings can be straightforwardly applied to learners' benefit. A key implication is the trite but nonetheless valid claim that "more research is needed." In the concluding section, I offer the view that responsible and useful programs offered to support learners in TS&SRL should seamlessly incorporate research activities.

Books About Study Skills

I opened by noting the widespread distribution and ready availability of books marketed to postsecondary (and other) learners about skills and strategies for learning. Hadwin, Tevaarwerk and Ross (2005) systematically analyzed 53 books authored

to introduce postsecondary learners to TS&SRL and help them develop productive skills, strategies, and dispositions for succeeding in the postsecondary context. The collection of books they examined were published between 1994 and 2005. To develop a system for coding content presented in these books, Hadwin and her colleagues sampled 20 books from the collection and constructed a comprehensive list of topics covered in those books. This yielded 18 topics: managing time, reading, note-taking, test taking, preparing for tests, memory and learning, anxiety and stress, listening, structuring the environment, setting goals, assignments: writing and presenting, motivation, classroom behavior, getting help or resources, using the library, technology, learning style, and developing vocabulary. Then, each of the 53 books in the entire collection was analyzed to describe the emphasis given each of these topics. Emphasis was quantified by a percentage computed as the number of pages devoted to a topic divided by total pages in a book. Hadwin and colleagues also examined the books to identify coverage of phases of SRL per the model of SRL proposed by Winne and Hadwin (1998).

Hadwin and colleagues observed considerable similarity among the books they examined: 94% at least introduced 11 of the 18 topics extracted for analysis. The five most common topics covered in the books were time management, reading, note-taking, test taking, and test preparation. The only topic covered in fewer than half the books was analyzing vocabulary.

The books also were very similar in their lack of material about what SRL is and how it plays out in learning. In the collection of 53 books, two offered one to two paragraphs describing SRL and three other books provided two to three pages of material, while two books included an entire chapter about SRL.

To explore further how SRL was implicitly represented, Hadwin's team examined the books' treatment of six common study tactics – listening, note-taking, reading, test preparation, test taking, and writing. The books' descriptions of each of these tactics were coded in terms of each of the phases of SRL: defining the task, setting goals and devising plans, enacting tactics and monitoring progress, and considering major adaptations to studying routines. For example, was note-taking described in relation to all four phases of SRL or just one of the phases? Hadwin et al. found the books were almost entirely limited to addressing phase 3, enacting and monitoring tactics, and in the treatment of phase 3, there was limited consideration of monitoring. Overall, learners were provided very little or no description about or guidance for considering the other phases of SRL. As well, the distribution of information about a tactic in relation to phases of SRL was typically spread out across the pages and chapters of a book rather than being formatted contiguously to reveal phases of SRL. They interpreted that this arrangement makes it challenging for learners to assemble a coherent view of a tactic's characteristics over the full range of phases in SRL. Only a few books presented learning strategies – such as the P.O.W.E.R. (Prepare, Organize, Work, Evaluate, and Rethink) strategy – in a way that invited learners to consider how that tactic is characterized in relation to unfolding SRL.

In general, books in the sample Hadwin's team examined set a limited stage for learners to enhance SRL. First, there was very little treatment of phase 1 of the SRL model, identifying the features that constitute a task. An important exception was

when the task was a test. When books did address phase 1 of SRL, they offered very little guidance about how to examine whether a task analysis was complete. Notably lacking were guidelines for deciphering the meaning of important task-related terms (e.g., analyze, debate) or for identifying subtle or even explicit goals set forth in the task's presentation. Material about phase 2, setting goals and planning means for reaching them, was allocated an entire chapter in 77% of the books where emphasis was given to dealing with and overcoming procrastination. The books provided hardly any content about phase 4, considering major adaptations to studying or, in general, how to strategically consider the arrangement of multiple tactics. Nor did the books encourage learners to build personalized versions of tactics after reflecting on particulars of tactics enacted in phase 3 of SRL.

In sum, the profile presented in this sample of books overemphasized what to do – phase 3, enacting tactics and strategies. There was minimal information provided about how to examine a task to understand more fully its form and resources (phase 1) or how to match methods for learning to critical features of tasks (phase 2). Importantly, learners were not alerted that becoming a better learner involves experimenting with new tactics and strategies, testing them and then tailoring them to one's personal situations. In this sense, it could be hypothesized that learners with motivation to try new methods for learning might often abandon them because they are insufficiently aware of and prepared to engage fully in SRL as a cyclic activity.

Major Reviews

Hattie, Biggs and Purdie (1996) conducted a meta-analysis of studies that researched the effects of interventions designed to change various psychological qualities of learners (e.g., attributions for successes or failures), equip learners with study skills, or prepare them to make productive use of structural aids, such as concept maps. These researchers further classified interventions in terms of whether the knowledge learners generated while studying was reproductive, approximately meaning accurate memory for information, or transformational, meaning that information studied would be reconfigured to suit a different purpose or be applied in a new context. I focus only on results related to performance on tests, GPA, or other measures of achievement. It should be noted that studies included in Hattie et al.'s meta-analysis involved participants ranging over the full spectrum of educational levels, not only postsecondary learners. Also, when samples participating in interventions were postsecondary learners, they were mostly self-selected and were other than "average" learners (e.g., classified in some way as candidates for remedial instruction).

Hattie et al. also summarized results from earlier meta-analyses (Table 4, p. 117). These studies reported effect sizes of .29 (elevating a learner's performance to approximately the 61st percentile) for teaching study skills (Kulik, Kulik, & Shwalb, 1983), .71 (76th percentile) for metacognitive instruction (Haller, Child, & Walberg, 1988), .34 (63rd percentile) for programs that taught learners methods that improved

note-taking (Henk & Stahl, 1985), .57 (72nd percentile) for interventions focusing on using textual aids such as underlining and building meaningful connections across structural units of text (Horak, 1985), and .94 (83rd percentile) for general programs (Sanders, 1980).

Interventions in the sample of studies reviewed by Hattie et al. where learners were taught general study skills had a weighted effect size of .26, elevating a learner's performance to approximately the 60th percentile relative to learners not participating in an intervention. Programs that taught learners to use structural aids had a weighted effect size of .58 (72nd percentile), while programs that focused on memory for information had a weighted effect size of 1.09 (86th percentile). When the outcome was reproductive, the overall effect size (including studies for which outcomes were other than achievement) was .66 (74th percentile), whereas the effect size was .43 (67th percentile) for transformational outcomes.

Hattie et al. recommended important caveats based on the studies they analyzed:

It is very difficult to change the study skills that students have acquired, usually over many years of study, and ... older students are more resistant to change. The improvement of student learning via the manipulation of study skills often fails to take account of the interaction between students' intentions and the context of learning ... Even when students do learn to be more flexible in their use of learning strategies, rigid teaching contexts often prevent the use of some strategies. (pp. 122, 123)

Other conclusions arising from Hattie et al.'s review merit noting. First, interventions focusing on a particular task-related skill had greater benefits than interventions providing exposure to and instruction on multiple skills. Second, while transfer to similar situations (so-called near transfer) was common, transfer to quite differing contexts (far transfer) was infrequent. Third, the most effective interventions melded instruction in study skills with supports for metacognition and motivation. Fourth, they interpreted that training in study skills should occur in contexts where learners study genuine content and there are authentic consequences for studying, e.g., in courses where learners are enrolled for grades rather than workshops separated from courses. Finally, to promote transfer, beyond merely acquiring study tactics and learning strategies, learners need "to understand how the strategy works, when and under what circumstances it is most appropriate" (p. 130).

In the same year as Hattie et al.'s review, Hadwin and Winne (1996) reviewed empirical studies on the effects of study tactics and learning strategies in postsecondary settings. They applied a variety of strict filters to prune and categorize an initial pool of 566 articles. For this chapter, I focus on two of their filters. One was that the study presented objective evidence that students actually used a new study tactic or learning strategy, i.e., treatment implementation was verifiable. Another was that students were enrolled in a course that was graded, as Hattie et al. had recommended.

Using these two criteria, Hadwin and Winne found only seven studies could be identified. In this very small set, two study tactics, concept mapping and self-questioning, received limited empirical support as methods that promoted students' grades. In concept mapping, learners transform information to be learned from a text or other medium into a spatially organized display of nodes (concepts)

and labeled links (verb phrases). Nodes represent key items of content (e.g., orangutan, mammal), and links are labeled to identify how nodes are related (e.g., is an example of, precedes). In self-questioning, learners scan material they are about to study and generate questions they will try to answer as they work through the material. Subsequent reviews and meta-analyses examining a much wider scope of participants and contexts corroborate Hadwin and Winne's conclusions about the beneficial effects of concept mapping and self-questioning (see Nesbit & Adesope, 2006 regarding concept maps; see Mulcavy-Ernt & Caverly, 2009 regarding questioning).

Robbins et al. (2004) meta-analyzed a variety of studies to investigate the extent to which various psychosocial and study skill factors predicted retention or academic performance as measured by GPA. In their research, study skills were considered "Cognitive, behavioral, and affective tools and abilities necessary to successfully complete task, achieve goals, and manage academic demands" (p. 267). Notably, among the variables investigated, measures of study skills had the lowest mean reliability, $r = .670$ and the highest standard deviation of reliabilities, $s = .178$. The mean of raw correlations between study skills and retention was $r = .298$. When measurement error was statistically corrected for both predictor and criterion, the mean corrected correlation was $\rho = .366$. For GPA, raw and corrected correlations were $r = .129$ and $\rho = .159$.

Robbins et al. also examined the incremental contribution of study skills in a context where the effects of various other measures of social and psychological factors were statistically controlled using multiple regression methodology. In analyses in which only "traditional" predictors of socioeconomic status, high school GPA, and college entrance scores (ACT or SAT) were included, study skills as residualized for those variables accounted for an incremental 6.8% of variance in retention, the least of other variables examined. However, when all social and psychological factors were considered for inclusion in a regression model predicting retention, the residualized study skill variable was not statistically detected as a predictor. In models predicting GPA, the residualized study skill variable made no statistically detectable contribution beyond the traditional predictors. Neither was it identified in a model including all social and psychological factors.

Credé and Kuncel (2008) meta-analyzed studies investigating the broad arena of study habits, study skills, and attitudes toward studying (collectively referenced by their first-letter abbreviation SHSAs). They distinguished research traditions that focused on SHSAs per se, as exemplified by self-report instruments such as the LASSI; in depth of information processing; and on students' metacognitive awareness (monitoring) that sets a stage for learners to regulate how they learn (metacognitive control). A focus in their meta-analysis was to explore a 4-component model that positions (a) general cognitive ability, prior training and experience, plus interests and personality factors all as moderators of SHSAs, which, in turn, (b) moderate learners' development of declarative knowledge, procedural knowledge, and motivation, which, in turn, (c) predict academic performance. A feature of their approach was making corrections for unreliability of measurements in estimating effect sizes.

Credé and Kuncel statistically detected many relationships with several or all of four indicators of academic achievement: first-semester freshman GPA, freshman GPA, general GPA, and performance in individual classes. Using the LASSI subscales as predictors, all subscales were statistically detected to predict general GPA and only one – anxiety – did not predict freshman GPA. An aggregate variable representing multiple study skills predicted performance in individual classes $\rho = .22$, first-semester GPA $\rho = .34$, freshman GPA $\rho = .39$, and general GPA $\rho = .41$. This trend could be interpreted as suggesting that the more specific the context, the lower the prediction of GPA using self-reports about TS&SRL variables. Notably, the aggregate indicator of self-reported study skills did not provide incremental predictive power over high school GPA or scores on college admission tests.

The depth of processing predictors for which data could be mined were not predictive of achievement ($p \geq .10$) with one exception: A modest correlation was observed between a deep approach to learning, which emphasizes relationships and making inferences based on studied information, and achievement in individual courses, $\rho = .18$.

Although I have not reported all findings bearing on the 4-component model Credé and Kuncel proposed because they are not directly relevant to this chapter, their meta-analysis did provide broad support for that model. This presents a rich but complex picture of the role of TS&SRL variables in achievement. Three important interpretations arise from Credé and Kuncel's complete meta-analysis. First, "[t]he effect of general cognitive ability on academic performance therefore appears to be partly mediated through the acquisition of good study skills, although a strong direct effect of cognitive ability on academic performance remains" (p. 441). Second, their findings do not support a view that depth of processing variables contribute to predicting achievement. Third, because of the relations observed in the studies they examined, Credé and Kuncel advise that well-designed self-report inventories addressing study habits, skills, and attitudes could add value to screening incoming students to recommend who might benefit from opportunities to polish or learn effective study techniques.

Sitzmann and Ely (2011) meta-analyzed studies examining "the current state of research on self-regulated learning and gaps in the field's understanding of how adults regulate their learning of work-related knowledge and skills" (p. 421). Their meta-analysis is presented here because (a) I assume adults engaged in learning in workplace settings share many characteristics with adults learning in postsecondary settings and (b) Sitzman and Ely's search included studies that investigated whether "training facilitated potentially ... education-relevant knowledge or skills" (p. 427). Facets of self-regulation were represented by trainees' self-reports on various scales including the MSLQ.

Sitzman and Ely reported a surprisingly large correlation, $\rho = .83$, between metacognition, which they characterized as "planning and monitoring goal-directed behavior and devoting attention toward the course material" (p. 429), and learning strategies, which they described as "techniques employed to elaborate on the training material as well as integrate all the components of the material with each other and with one's existing knowledge" (p. 429). Seven other correlations exceeded $\rho \geq .70$,

but many of these came from just one or just three studies, which weakens their role in a meta-analysis which seeks to amalgamate results from many studies. On the basis of these overall quite large correlations among theoretically different facets of TS&SRL, Sitzman and Ely interpreted that participants in studies might not be able to distinguish among these constructs when responding to self-report items. Overall, these researchers suggest combining the constructs of planning, monitoring, and learning strategies to form a broader construct characterizing metacognitive strategies.

When learning was the variable to be predicted, the four strongest TS&SRL predictors were goal levels trainees set for themselves ($\rho=.44$), self-efficacy ($\rho=.35$), effort ($\rho=.28$), and persistence ($\rho=.27$). In a complex regression model predicting achievement using TS&SRL variables after statistically residualizing for cognitive ability and pre-training knowledge, these four residualized variables accounted for a total of 17% of variance in outcomes. It is worth noting that setting more challenging goals (residualized) related negatively to achievement in this context where prior knowledge was statistically partialled out. Sitzman and Ely interpreted that trainees with lots of knowledge who set more challenging goals for the area being trained had less opportunity to learn more.

Several moderator variables were examined in Sitzman and Ely's work as potential influences on relations between TS&SRL variables and achievement. Characteristics of the population participating in a study and type of study – correlational or experimental – were not statistically detectable moderators of findings. Length of the course moderated effects in only one sense: In shorter training courses, the level of goals trainees reported setting had a stronger relation to learning. Sitzman and Ely interpreted that the lack of moderator effects bolsters the generalizability of their findings.

In summary, Sitzman and Ely concluded that TS&SRL variables play an instrumental role in predicting learning and that “trainees who engage in self-regulatory activity tend to learn more than those who fail to self-regulate” (p. 435). However, they noted that measures per se or the people responding to self-report measures struggle to distinguish several constructs that are theoretically considered separable. Moreover, “counter to self-regulation theory, several key regulatory mechanisms – planning, monitoring, help seeking and emotion control – did not have significant effects on learning” (p. 438).

Richardson, Abraham and Bond (2012) conducted a meta-analysis that examined various correlates of university students' academic performance as indicated by GPA. The studies they examined were limited to those using students' self-reports about TS&SRL. For a cluster of variables they labeled self-regulatory learning strategies, studies that were meta-analyzed combined subscale scores from either the LASSI or the MSLQ. Another class of variables investigated in the meta-analysis was labeled student approaches to learning, which the authors described as:

The *deep* approach is characterized by learning strategies such as critical evaluation and information syntheses combined with an intrinsic motivation to learn. By contrast, *surface* approaches involve shallow cognitive strategies, such as memorization and rehearsal,

in combination with an extrinsic motivation to learn. Finally, students adopting a *strategic* approach are thought to use both deep and surface strategies depending on the importance and characteristics of the task. (p. 361)

Data representing students' approaches to learning were represented by various self-report measures.

Results for the set of studies that investigated self-regulatory learning strategies revealed six findings describing small, positive and statistically detectable relations to GPA. Richardson et al. collapsed the MSLQ scale of metacognitive self-regulation with the LASSI scale of self testing into a cross-scale variable they labeled metacognition. It had a mean weighted correlation with GPA, $r^+ = .18$. Critical thinking from the MSLQ correlated with GPA, $r^+ = .15$. A variable Richardson et al. called elaboration merged the LASSI scale for information processing and the MSLQ scale for elaboration; it correlated with GPA, $r^+ = .18$. Concentration from the LASSI correlated with GPA, $r^+ = .16$. Time/study management representing scales from both the LASSI and MSLQ correlated $r^+ = .22$ with GPA. Help seeking and peer learning from the MSLQ correlated with GPA, $r^+ = .15$ and $r^+ = .13$, respectively.

Findings for the measures of students' approaches to learning were marginally stronger and in expected directions. Surface learning had a mean weighted correlation with GPA, $r^+ = -.18$. Deep and strategic approaches to learning were observed to have small and positive correlations with GPA, $r^+ = .14$ and $r^+ = .23$, respectively.

The preceding results provide information about each variable's correlation with GPA but what are their relative contributions to predicting GPA when the variables are considered as a set? Richardson et al. used a sophisticated regression methodology to explore this question. Among the set of self-regulatory learning strategies, effort regulation was the most potent predictor of GPA, $\beta = .32$. The remaining residualized variables had meager relationships to GPA in the model that statistically considers each variable with others partialled out. β s ranged from .02 to .07.

Summary of Reviews

The majority of primary studies in which relationships were explored between TS&SRL variables and achievement used learners' (or trainees') self-reports as the indicator of whether how or how often study tactics and learning strategies were applied (Zimmerman, 2008). Reviews and meta-analyses of these findings show considerable variability and generally modest positive relations or effects. It is not particularly clear why effects are so variable and generally modest. One possibility, as noted earlier, is that learners' self-reports may be unreliable indicators of what they actually do when they study. Because what learners do matters more than what they may misremember as having done, and if self-reports are somewhat inaccurate, it would not be surprising these results are variable and minor.

Setting aside weaknesses of self-reports about TS&SRL, which would substantially undermine confidence in prior claims that teaching learners to make more or better use of study skills will have benefits, another possibility is that there are many moderators of relations between learners' uses of study skills and their achievement. If this is the case, it would cloud predictions that require generalizing about benefits realized if learners make better or more use of study tactics and learning strategies. Finally, as Robbins et al. (2004) reported, self-report measures of study skills suffer some psychometric challenges that interfere with developing clear pictures of how those data relate to other variables.

Reviews of studies in which learners were trained to use specific study tactics or learning strategies afford a somewhat more optimistic interpretation but I continue to recommend prudence. First, almost none of these studies verified with trace data that, after training, learners actually applied the tactics or strategies they were taught. Under the view that learners are self-regulating agents, training may instead motivate learners to be more active in striving to productively SRL. If this was the case, we might expect much more solid evidence about far transfer but, regrettably, that evidence is very scarce. While it should not be overlooked that interventions may have a modest benefit, it is not clear what caused that effect.

Hattie et al.'s (1996) findings that (a) learners struggle to modify long-practiced habits, (b) omnibus training was less beneficial than focused training on single study tactics, and (c) transfer was weak from out-of-course training settings to course-work suggest that learners struggle to engage in productive SRL. Sitzman and Ely's (2011) interpretations that (a) learners may not distinguish tactics from SRL and (b) their self-reports of SRL-related variables do not predict outcomes together suggest postsecondary learners may start out with a muddled view of how to productively self-regulate studying activities.

Aptitude for postsecondary studies, represented by entrance examinations or specific course-related knowledge, was reported by Credé and Kuncel (2008) and by Robbins et al. (2004) to affect achievement. In the former but not the latter reports, this effect was mediated by "good study skills." This, along with Sitzman and Ely's just mentioned finding, suggests learners may struggle to distinguish whether benefits they may gain from developing new study skills are due to that effort or to preexisting aptitude (general ability). Because learning new study tactics robs time from course-related studying per se, the aggregate of these findings leads to a conjecture that learners may not persist long enough after training in study skills to develop expertise they need to elevate achievement. This could, in part, account for the mixed levels of as well as the variability of prior findings.

In sum, research has not yet generated consistent or strong evidence that applying tactics for studying generates significantly more or more robust knowledge. On the other hand, there is practically no evidence that study tactics are detrimental except for the potential issue of whether time taken to learn and use them costs learners' time that might be better spent studying in whatever ways learners do. Perhaps with hopes that learning can be improved by applying the "right" combination of study

skills, a variety of systems that organize them have been proposed. I examine this issue next.

Systems of Study Skills

Robinson (1946) was perhaps the first to publish a recommendation that learners apply a multicomponent method for studying, the SQ3R method. To implement SQ3R, learners first survey material they are studying, focusing on topic headings. Second, each heading should be transformed into a question that the learner predicts can be answered by reading material in that section. Next, sections are read to answer the questions framed in step two. Fourth, the main points and key details are recited. Finally, all these bits of information should be reviewed.

In a first review of research on SQ3R, Caverly, Orlando and Mullen (2000) concluded that while some of the individual steps may boost learning, there was meager evidence that the entire system is effective. An updated review (Mulcahy-Ernt & Caverly, 2009) reached essentially the same conclusion.

Despite meager empirical proof of the value of SQ3R, it spawned many offshoots. One example is the PORPE method for studying for essay items: predict what will be tested, organize ideas as paraphrases, rehearse those key ideas, practice recalling the key ideas, and evaluate written answers for completeness, accuracy, and appropriateness (Simpson, 1986). Another is PLAE in which learners put SRL into action by “Preplanning or defining tasks and goals, Listing or selecting the strategies they will employ and constructing task-specific study plans, Activating or implementing the plan and using appropriate fix-up strategies, and Evaluating the plan’s effectiveness once they receive feedback” (Nist & Simpson, 1989, p. 183). Mulcahy-Ernt and Caverly (2009) concluded after surveying research on these and other systems for studying that they yield “positive benefits” (p. 190), but their conclusion stands in contrast to several meta-analyses just reviewed. At present, the benefits of such systems for studying appear moot.

Impediments to Applying Study Tactics and Learning Strategies

Some research cited in this chapter and hundreds to thousands of primary studies published in the fields of educational psychology and learning science offer extensive, scientifically sound, and statistically detected findings (typically, $p \leq .05$) describing that learners can change how they study and, by doing so, they can boost achievement. Nonetheless, veteran staff in learning skill centers and other student support services, course instructors, and students themselves will quickly verify that few of the many choices from this catalog of empirically validated study tactics and learning strategies are practiced. In this section, several impediments to learners taking up tactics and strategies are briefly identified.

I Know What I'm Doing

The first step toward productively self-regulating learning is developing an accurate perception of features that characterize tasks and assignments. Hadwin (2006) and her colleagues (see Oshige, 2009; Miller, 2009; Miller & Hadwin, 2010) have observed that accurate task understanding accounts for statistically detectable variability in grades learners receive on a task, in a course and overall GPA. While tasks may seem clear to instructors and some students, not all learners accurately map the key attributes of tasks that are essential to understanding them. When this happens, tactics and strategies learners choose for approaching a task and standards they choose for judging progress can lead them astray.

It's Not Working

Study tactics and learning strategies are skills. As such, learners must extensively and deliberately practice them to develop expertise (Ericsson, Krampe, & Tesch-Romer, 1993; Winne, 1997). In the very early phases of developing expertise, when a newly learned skill is not yet fully automated, learners experience considerable cognitive load because they must apportion mental resources between studying *per se* and laboring to apply nascent tactics and strategies. A common result is that performance suffers. This phenomenon is called the utilization deficiency (see Miller & Seier, 1994).

Learners who experience a utilization deficiency as they experiment with new study tactics likely have neither the luxury of delaying coursework nor opportunities to reduce other demands (e.g., paid employment, family obligations). They may well reason, “I realize this new study tactic might ultimately benefit my learning but I can’t afford to work on it now.” As a result, they revert to old practices without giving the new tactics a full chance to work.

I Thought I'd Learned It

A wide range of studies have demonstrated that learners, and people in general, commonly err in judging what they know, the levels of their skills and their success in future activities (Dunning, Heath, & Suls, 2004). Learners’ assessments of knowledge commonly agree only moderately with objective or instructor-developed measures, and learners typically are overconfident about their competence in applying recently studied or newly developed skills. In one sense, this optimism is helpful in that learners may be willing to try to learn subjects or develop new skills. But when failure depresses motivation and interferes with developing productive SRL, learning suffers.

Two distinct expressions of flawed self-assessment play key roles in thwarting productive SRL. First, learners need to be able to distinguish what they know from what they do not know, so they can restudy material they don't know. Regarding these so-called judgments of learning, it is well known that postsecondary learners are moderately accurate judges of the extent of their knowledge about a topic but are typically poor judges of which particular elements within a topic they know or don't know. As well, unless they are pressed for time to study or material that is more difficult is disproportionately favored in generating marks, learners tend to dedicate time for restudying to more difficult material rather than easier material. The net effect of these two influences is that the full range of material needing additional study is often not attended to, and because difficult material is preferred, less content overall can be restudied (see Dunlosky & Ariel, 2011).

Second, as noted earlier and acknowledging there is limited research, learners are not very accurate when recalling which tactics and strategies they use for studying (Winne & Jamieson-Noel, 2002). And, methods they choose typically are not optimal (Winne & Jamieson-Noel, 2003). When learners judge it would be appropriate to change the tactics and strategies to study more productively, these misperceptions put them at risk for wrongly diagnosing what led to underachievement in the first place and for making less than optimal choices about how to study differently.

Together, these two shortcomings put learners in a situation such that changes to study tactics and learning strategies unfortunately have high probabilities to fail. Change per se may become punishing, so it may be avoided.

Conclusions

There is overwhelming evidence that study tactics and learning strategies have strong appeal. Balancing this appetite is some, but neither overwhelming nor particularly clear, evidence that TS&SRL factors can elevate achievement and satisfaction among postsecondary learners. What appears very problematic is the transfer of benefits that are demonstrated in myriad lab-based and highly controlled field trials to everyday studying by learners in general. In light of these findings, would learners' time and institutional resources be better spent elsewhere?

This sharp and relevant question is not one that can be answered based solely on information presented in this chapter. However, because myriad lab-based and highly controlled field trials generate a strong expectation that, under the "right" conditions, there are benefits to be realized, abandoning the idea that TS&SRL can have positive effects seems to throw out the baby with the bathwater.

In this context, I propose a strategy that is grounded in but admittedly steps beyond the empirical evidence reviewed in this chapter. The premise of this strategy embraces a central tenet of self-regulated learning, namely, that each learner is a capable agent who experiments with learning (and the rest of life) to try to enhance it. In this context, the strategy I propose is this: Enlist learners as colleagues in researching

Table 8.1 A study tactic called compact notes

Title	Compact notes
Steps	<ol style="list-style-type: none"> 1. Analyze each paragraph. Choose from it or create only 5–7 of your own words that best represent all the important information in the paragraph 2. Make a compact note about each paragraph. Title each note. Use only the 5–7 words in the note’s body 3. Do not copy and paste entire phrases or sentences into a note
Checkpoints	<p>Does the source have a glossary that lists key terms and concepts? Are these included in your note? Is a special format (e.g., italics, bold) used to signal important information?</p> <p>Are you making one note for every paragraph?</p> <p>Should you use a diagram note instead to show how the terms/concepts interact?</p> <p>After studying the entire reading assignment, review the title of each note in order: note 1, then note 2, then note 3, and so on until the last note.</p> <p>Can you recall the words in the body of each note?</p> <p>Should you change any words in the body of the note to improve it?</p>
Theory	<p>When you analyze a paragraph to choose only 5–7 words that best represent information in the paragraph, you:</p> <p>Monitor your understanding. If you decide you don’t understand, you can apply other tactics to fix that problem</p> <p>Rehearse information. Rehearsing improves recall</p> <p>Summarize. Summarizing improves recall and comprehension</p>
Source	Igo, Bruning and McCrudden (2005)
Build a strategy	<p>Reviewing notes (distributed practice)</p> <p>Note forms (schemas: explanation, system)</p> <p>Diagram notes</p> <p>Retrieval practice</p>
Terms	Deep processing

TS&SRL. In closing the chapter, I sketch an approach to productively accommodating learners’ and institutions’ appetites for study tactics and learning strategies. It provides a way each can extend and strengthen the foundation for understanding and productively using study tactics and learning strategies in postsecondary education.

The proposal has three keys. First, learners need access to information about study tactics and learning strategies. Beyond books and institutionally provided workshops or courses, peers should not be overlooked. In our local context, my research team is surveying basic research in learning science to build a library of study tactics that will be made available to learners on a searchable Web site. Table 8.1 shows an entry for a tactic titled “Compact notes.” Each tactic has common features: a title for reference, steps the learner should carry out, checkpoints to track progress in implementing the tactic, a brief account of the theory that explains why the tactic may have benefit, the research-based source(s) for the tactic, a list of other tactics in the library that the learner might amalgamate to build a strategy, and a pointer to key terms defined elsewhere on the Web site that provide

a language with which the learner can discuss and metacognitively consider TS&SRL factors.

The second key to the proposal is recognizing that learners need to practice tactics coupled with freedom to practice them without jeopardizing grades and, most preferred, in a way that may boost achievement. One suggestion is to make practicing tactics an avenue for gaining supplemental credits for participation. That is, instead of informally awarding credits for attendance or speaking in class, credit learners for practicing tactics. In the case of compact notes, the notes learners produce could be handed in (or posted to a learner's Web site) for quick perusal, and a reasonable award given for acceptable compact notes. In this way, practicing tactics and studying content become fused in a way that unequivocally relates to the course. If there are many tactics registered in the tactic library, learners can swap tactics as they see fit (and as models of SRL would entail). Each of those tactics, however, should afford fusing work on course content with practicing tactics.

Third, as the example of compact notes handily illustrates, design methods by which individual learners can generate objective data that they and their institutions can use to research effects of TS&SRL factors. The example of compact notes reflects an ideal, i.e., that each use of a tactic generates a trace of its use. Trace data, bolstered by other data about tactics and course achievements, allow learners as well as institutions to carry out research that advances what each wants to know about TS&SRL factors. For example, compact notes afford investigating a variety of questions related to this study tactic: Does the number of compact notes generated (assuming not every learner will generate a compact note about every paragraph) correlate with scores on tests? Are test items more likely answered correctly by learners who make compact notes about information essential to answering those items? Are learners' judgments of learning (or efficacy) more accurate when they generate compact notes versus using other tactics? Are compact notes chosen often? Are they chosen differentially dependent on kinds of materials or the discipline studied? Are compact notes popular, indicating learners judge them effective and efficient, relative to another tactic?

As data accumulate by carrying out this grass roots approach to investigating elements of TS&SRL, those data can be mined to identify kinds of assignments, courses, and other structural factors that may moderate patterns of tactics' use and tactics' effects. If data about learners are gathered alongside traces and measures of their achievement, it is likely individual differences can be identified that can tailor recommendations about tactics to clusters of learners in ways that interlace with their preferences and objectives. Because learners are agents in SRL, all these "findings" should be presented as suggestions to learners for exploration as they pursue programs of personal experimental research situated in their lives as post-secondary students. The cumulative results of students' individual programs research will generate a more robust as well as a finer-tuned science of learning.

Acknowledgment Alissa Bick Ehrenkranz provided significant assistance in identifying and analyzing source materials for this chapter. Support for this work was provided by grants to Philip H. Winne from the Social Sciences and Humanities Research Council of Canada (410-2011-0727), the Canada Research Chair Program, and Simon Fraser University.

References

- Alexander, P. A., Graham, S., & Harris, K. R. (1998). A perspective on strategy research: Programs and prospects. *Educational Psychology Review*, 10, 129–154.
- Beaudoin, L. P., & Winne, P. H. (2009, June). *nStudy: An internet tool to support learning, collaboration and researching learning strategies*. Canadian e-Learning Conference. Vancouver, Canada.
- Borsboom, D., Mellenbergh, G. J., & van Heerden, J. (2003). The concept of validity. *Psychological Review*, 111, 1061–1071.
- Caverly, D. C., Orlando, V. P., & Mullen, J. L. (2000). Textbook study reading. In R. F. Flippo & D. C. Caverly (Eds.), *Teaching reaching and study strategies at the college level* (pp. 86–165). Newark, DE: International Reading Association.
- Corno, L., Cronbach, L. J., Kupermintz, H., Lohman, D. F., Mandinach, E. B., Porteus, A. W., & Talbert, J. E. (2001). *Remaking the concept of aptitude: Extending the legacy of Richard E. Snow*. Mahwah, NJ: Erlbaum.
- Credé, M., & Kuncel, N. R. (2008). Study habits, skills, and attitudes: The third pillar supporting collegiate academic performance. *Perspectives on Psychological Science*, 3, 425–453.
- Dunlosky, J., & Ariel, R. (2011). Self-regulated learning and the allocation of study time. *Psychology of Learning and Motivation*, 54, 103–140. Elsevier Inc.
- Dunning, D., Heath, C., & Suls, J. M. (2004). Flawed self-assessment: Implications for health, education, and the workplace. *Psychological Science in the Public Interest*, 5(3), 69–107.
- Ericsson, K. A., Krampe, R. T., & Tesch-Romer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100, 363–406.
- Flavell, J. H. (1979). Metacognitive and cognitive monitoring: A new area of cognitive developmental inquiry. *American Psychologist*, 34, 906–911.
- Hadwin, A. F. (2006). Do your students really understand your assignment? *LTC Currents Newsletter*, 2(3), 1–9.
- Hadwin, A. F., Tevaarwerk, K. L., & Ross, S. (2005, April). *Do study skills texts foster self-regulated learning: A content analysis*. Paper presented at the annual meeting of the American Educational Research Association, Montreal, QC, Canada.
- Hadwin, A. F., & Winne, P. H. (1996). Study strategies have meager support: A review with recommendations for implementation. *Journal of Higher Education*, 67, 692–715.
- Hadwin, A. F., & Winne, P. H. (2012). Promoting learning skills in undergraduate students. In M. J. Lawson & J. R. Kirby (Eds.), *Enhancing the quality of learning: Dispositions, instruction, and mental structures* (pp. 201–227). New York: Cambridge University Press.
- Haggard, P., & Tsakiris, M. (2009). The experience of agency: Feelings, judgments and responsibility. *Current Directions in Psychological Science*, 18, 242–246.
- Haller, E. P., Child, D. A., & Walberg, H. J. (1988). Can comprehension be taught? A quantitative synthesis of “metacognitive” studies. *Educational Researcher*, 77(9), 5–8.
- Hattie, J., Biggs, J., & Purdie, N. (1996). Effects of learning skills interventions on student learning: A meta-analysis. *Review of Educational Research*, 66, 99–136.
- Henk, W. A., & Stahl, N. A. (1985). A meta-analysis of the effect of notetaking on learning from lectures. *National Reading Conference Yearbook*, 34, 70–75.
- Horak, W. J. (1985, April). *Meta-analysis of learning science concepts from textual materials*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, French Lick Springs, IN.
- Igo, L. B., Bruning, R., & McCrudden, M. T. (2005). Exploring differences in students’ copy-and-paste decision making and processing: A mixed-methods study. *Journal of Educational Psychology*, 97(1), 103–116. doi:10.1037/0022-0663.97.1.103.
- Karabenick, S. A., Woolley, M. E., Friedel, J. M., Ammon, B. V., Blazevski, J., Bonney, C. R., DeGroot, E., et al. (2007). Cognitive processing of self-report items in educational research: Do they think what we mean? *Educational Psychologist*, 42, 139–151.
- Kulik, C. C., Kulik, J. A., & Shwalb, B. J. (1983). College programs for high-risk and disadvantaged students: A meta-analysis of findings. *Review of Educational Research*, 53, 397–414.

- Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice-Hall.
- Miller, M. F. W. (2009). *Predicting university students' performance on a complex task: Does task understanding moderate the influence of self-efficacy?* Unpublished Master's thesis. University of Victoria, Victoria, BC, Canada.
- Miller, M., & Hadwin, A. F. (2010, May). *Supporting university success: Examining the influence of explicit and implicit task understanding and self-efficacy on task performance*. Paper presented at the annual meeting of the Canadian Society for the Study of Education, Concordia University, Montreal, QC, Canada.
- Miller, P. H., & Seier, W. L. (1994). Strategy utilization deficiencies in children: When, where, and why. In H. W. Reese (Ed.), *Advances in child development and behavior* (Vol. 25, pp. 107–156). San Diego, CA: Academic.
- Mulcavy-Ernt, P. I., & Caverly, D. C. (2009). Strategic study-reading. In R. F. Flippo & D. C. Caverly (Eds.), *Handbook of college reading and study strategy research* (pp. 177–198). New York: Routledge.
- Nesbit, J. C., & Adesope, O. O. (2006). Learning with concept and knowledge maps: A meta-analysis. *Review of Educational Research*, 76, 413–448.
- Nist, S., & Simpson, M. L. (1989). PLAE, a validated study strategy. *Journal of Reading*, 33, 182–186.
- Oshige, M. (2009). *Exploring task understanding in self-regulated learning: Task understanding as a predictor of academic success in undergraduate students*. Unpublished Master's thesis. University of Victoria, Victoria, BC, Canada.
- Pintrich, P. R., Smith, D. A. F., García, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement*, 53, 801–813.
- Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, 138, 353–387.
- Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college out-comes? A meta-analysis. *Psychological Bulletin*, 130, 261–288.
- Robinson, F. P. (1946). *Effective study*. New York: Harper.
- Sanders, V. (1980, March). *College reading and study programs: Do they make any difference?* Paper presented at the annual meeting of the Western College Reading Association, San Francisco, CA.
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. New York: Houghton Mifflin.
- Shavelson, R., & Towne, L. (2002). *Scientific research in education: Report of the National Research Council's committee on scientific principles in education*. Washington, DC: National Academy Press.
- Simpson, M. L. (1986). Prope: A writing strategy for studying and learning in the content areas. *Journal of Reading*, 29, 407–414.
- Sitzmann, T., & Ely, K. (2011). A meta-analysis of self-regulated learning in work-related training and educational attainment: what we know and where we need to go. *Psychological Bulletin*, 137, 421–42.
- Tourangeau, R., Rips, L. J., & Rasinski, K. (2000). *The psychology of survey response*. Cambridge, UK: Cambridge University Press.
- Weinstein, C. E., Husman, J., & Dierking, D. R. (2000). Self-regulation interventions with a focus on learning strategies. In P. R. Pintrich & M. Boekaerts (Eds.), *Handbook on self-regulation* (pp. 727–747). New York: Academic.
- Weinstein, C. E., Schulte, A., & Palmer, D. R. (1987). *The learning and study strategies inventory*. Clearwater, FL: H & H Publishing.

- Winne, P. H. (1982). Minimizing the black box problem to enhance the validity of theories about instructional effects. *Instructional Science*, 11, 13–28.
- Winne, P. H. (1983). Distortions of construct validity in multiple regression analysis. *Canadian Journal of Behavioural Science*, 15, 187–202.
- Winne, P. H. (1997). Experimenting to bootstrap self-regulated learning. *Journal of Educational Psychology*, 89, 397–410.
- Winne, P. H. (2001). Self-regulated learning viewed from models of information processing. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (2nd ed., pp. 153–189). Mahwah, NJ: Lawrence Erlbaum Associates.
- Winne, P. H. (2010a). Bootstrapping learner's self-regulated learning. *Psychological Test and Assessment Modeling*, 52, 472–490.
- Winne, P. H. (2010b). Improving measurements of self-regulated learning. *Educational Psychologist*, 45, 267–276.
- Winne, P. H. (2011). A cognitive and metacognitive analysis of self-regulated learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 15–32). New York: Routledge.
- Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D. Hacker, J. Dunlosky, & A. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 277–304). Mahwah, NJ: Lawrence Erlbaum.
- Winne, P. H., & Hadwin, A. F. (in press). nStudy: Tracing and supporting self-regulated learning in the Internet. In R. Azevedo & V. Aleven (Eds.), *International handbook of metacognition and learning technologies*. New York: Springer.
- Winne, P. H., & Jamieson-Noel, D. L. (2002). Exploring students' calibration of self-reports about study tactics and achievement. *Contemporary Educational Psychology*, 27, 551–572.
- Winne, P. H., & Jamieson-Noel, D. L. (2003). Self-regulating studying by objectives for learning: Students' reports compared to a model. *Contemporary Educational Psychology*, 28, 259–276.
- Winne, P. H., & Perry, N. E. (2000). Measuring self-regulated learning. In M. Boekaerts, P. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 531–566). Orlando, FL: Academic.
- Winne, P. H., Zhou, M., & Egan, R. (2011). Designing assessments of self-regulated learning. In G. Schraw & D. H. Robinson (Eds.), *Assessment of higher-order thinking skills* (pp. 89–118). Charlotte, NC: Information Age Publishing.
- Zhou, M., & Winne, P. H. (2012). Modeling academic achievement by self-reported versus traced goal orientation. *Learning and Instruction*, 22, 413–419.
- Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal*, 45, 166–183.

Chapter 9

The History and Historiography of Teacher Preparation in the United States: A Synthesis, Analysis, and Potential Contributions to Higher Education History

Christine A. Ogren

James Fraser's (2007) history of teacher preparation in the United States begins with future president John Adams' autobiographical account of his 1755 graduation from Harvard. Unsure of his ultimate career goal, Adams decided during his senior year, "that I would take a School." At commencement, he met "Mr. Mccarty of Worcester who was empowered by the Select Men of that Town to procure them a Latin Master for their Grammar School" and "engaged me to undertake it" (p. 10). Harvard-educated Adams taught in Worcester for 3 years, evidencing historian of teacher education Merle Borrowman's (1965) observation, "One can well argue that teacher education is among the oldest functions of the liberal arts college and the university" (p. 1). In fact, the *licentia docendi* – license to teach – was the first degree offered in the medieval universities. In his iconic history of the rise of the Western university in the Middle Ages, Charles Homer Haskins (1923/1957) noted that the Master of Arts certified teachers of the liberal arts and the Doctor of Laws certified teachers of law, allowing them to join the faculty guild.

Adams' preparation, like that of students in the medieval universities, did not include instruction in pedagogy or teaching methods; the reigning assumption through the eighteenth century was that knowing a subject well was all that was necessary in order to teach it. In the nineteenth century, pedagogy appeared and grew as a field of study. As new institutions arose with teacher education as their official purpose and existing colleges and universities added instruction in pedagogy, a new and often uneasy phase began for higher education's role in teacher preparation. During the remainder of the nineteenth, throughout the twentieth, and into the twenty-first century, higher education institutions would struggle over whether and how to prepare teachers for K-12 schools and whether and how to welcome the types of students that teacher education attracted.

C.A. Ogren, Ph.D. (✉)

Educational Policy and Leadership Studies, University of Iowa,
491 Lindquist Center North, Iowa City, IA 52242, USA
e-mail: chris-ogren@uiowa.edu

Although one of higher education's oldest functions and a subject of dispute for nearly two centuries, teacher preparation has been and remains peripheral in scholarship on the history of colleges and universities. In the introduction to his large-scale history, Fraser (2007) reflects, "the history of teacher education is one of the most overlooked topics in the history of American education today" (p. 2). While his book satisfies a great need for a comprehensive history, teacher education has hardly been understudied. Generations of historians of teacher education have described in careful detail the evolution of various aspects of the training of schoolteachers. Yet this work seems diffuse because scholars have tended to focus on particular institutions or issues within teacher education, even as together they have produced a relatively large body of literature. It is in the broader area of the history of colleges and universities that teacher preparation has been and remains overlooked. Even though scholarship on the history of higher education has expanded considerably since the 1960s, work in this field has generally mentioned teacher preparation only in passing. Synthesizing the scattered historiography of teacher education and better integrating it with the historiography of higher education will enhance scholarship in both areas. This chapter is a step in that direction.

As important as the opportunity to teach was to John Adams and other students of the eighteenth century and earlier, historians of teacher education have focused almost exclusively on the rise and trajectory of education as a field. At the same time, much of the work of historians of higher education has also looked at the last two centuries. Therefore, this chapter reflects the literature in focusing on the nineteenth and twentieth centuries. The chapter has two main sections. The first and longer part highlights the collective richness of and identifies gaps that remain in the historiography of three distinct time periods in the history of teacher preparation: "Beginnings" from the 1820s through the 1880s, "Transitions" from the 1890s through the 1930s, and "Upgrading Amid Disfavor" from the 1940s into the twenty-first century. For each period, this section synthesizes and analyzes early scholarship, which generally focuses on institutional and organizational leaders and approaches to teacher education, along with histories published in the last few decades, which more often reflect the rise of social history – the history of ordinary people – in using gender, class, and race as categories of analysis. The chapter's second part interrogates the peripheral position of teacher education in the historiography of higher education. Also influenced by social history approaches, much of the historiography of higher education published since the 1970s has sought to incorporate the experiences of underrepresented groups of students, as well as to understand the roles of the variety of nineteenth-century institutions and the twentieth-century institutional hierarchy in American higher education. This section demonstrates how works that have looked seriously at teacher preparation suggest that it is essential for advancing scholarship in these areas. Teacher education has been a core element of higher education since its inception in the USA; it must come in from the historiographical periphery.

History and Historiography of Teacher Preparation

Several years after the 1983 appearance of the report of the President's National Commission on Excellence in Education, *A Nation at Risk: The Imperative for Educational Reform*, educational historian Donald Warren (1985, 1989) lamented that interest in teacher preparation was cyclical, arising from debates over education reform. He observed that critics of the schools repeatedly focused on teachers and "their training," which they argued "lacks rigor and substance" (1989, p. 2) and stated that this pattern reinforced attention-grabbing complaints such as teacher-education professor and reformer Gary Sykes' "characterization of teacher preparation as 'higher education's dirty little secret'" (1985, p. 2). To interrupt the cycle, Warren (1985, 1989) called for sustained scholarly attention to the history of teacher education. Existing scholarship, Mark Ginsburg (1987) added, was overly functionalist, lacking "attention to social struggle, resistance and contestation" (p. 5). Historians operating from a functionalist perspective focused on the "salient dimensions" of "status competition and professionalization projects" but overlooked "the contradictions embedded within unequal class and gender relations" (p. 7). Ginsburg essentially called for historians of teacher education to utilize social history approaches.

Some historians of teaching and teacher education began to employ this social history perspective in the 1980s. John Rury (1989) analyzes teachers' social characteristics, suggesting just how integral the dimensions of gender and class, as well as race, are to the history of teacher preparation. Rury uses census data and other records to outline the transition of teaching from an occupation dominated by men like John Adams – white, middle-class, often well-educated, usually young, and often holding other jobs or planning on other careers – into an occupation open to a broader population. Adams' characteristics were prevalent from the colonial period into the early to mid-nineteenth century, when men began to move out of teaching once it began to require more training and school terms grew longer, beginning in the Northeast. As public-school systems grew, by the end of the nineteenth century, teachers were in great demand, and feminization spread throughout the country. Until the mid-twentieth century, when it became more acceptable for married women to teach, these teachers tended to come from rural middle-class or immigrant backgrounds, and they remained mostly white and young. Rury points out that African-Americans were underrepresented among US teachers, although they were better represented in teaching than in any other professional field. He summarizes, "Because teaching was a relatively accessible profession, and therefore attracted educated members of social groups generally denied access to the high-status professions, it often was viewed as second-rate" (p. 10). These shifts in the gender, class, and race characteristics had important ramifications for the history of teacher education.

Since the early 1980s, many educational historians have answered Warren's (1985, 1989) call for more attention to teacher education, and most have heeded

Ginsburg's (1987) admonition to move beyond a functionalist focus on professional trappings and status. The works of earlier historians remain important contributions, however, as their focus on leaders and organizing ideas in education provides a necessary "top-down" perspective on the development of professional approaches to teacher education. Encapsulated in the title of Willard Elsabee's (1939/1970) history, *The American Teacher: Evolution of a Profession in a Democracy*, this approach tends to optimistically suggest that teaching either was or soon would be accepted as a profession. More recent histories complement earlier work by taking more "bottom-up" approaches, often focusing more directly on how student characteristics and societal issues affected teacher education. Evidenced by the title of Warren's (1989) edited collection, *American Teachers: Histories of a Profession at Work*, these later approaches tend to question and complicate issues of teachers' professional status. Together, top-down earlier works and more recent bottom-up histories illuminate many dimensions of teacher preparation during three distinct periods.

1820s–1880s: Beginnings

Concerned in 1750 "that the country was 'suffering at present very much for want of good Schoolmasters'" (Borrowman, 1956, p. 35), Benjamin Franklin proposed an academy for the preparation of teachers. There was still no such institution in the USA in 1816, when Denison Olmstead outlined in a commencement speech at Yale "his plan of 'an academy for schoolmasters'" (Gordy, 1891, p. 10). However, the idea would gain traction within the next decade. Between the 1820s and the 1880s, the first normal schools and other teacher-preparation institutions appeared, while existing academies, colleges and universities added courses in pedagogy, and the content of teacher education slowly took shape. Historians of teacher education agree that these processes were far from quick or smooth and that uncertainty about content, form, and even whether universities should teach pedagogy, remained even after seven decades. According to Gordy, normal schools' contribution during their early years lay "not so much in the teaching of any particular philosophy of education as in the recognition of the fact that there is such a philosophy" (p. 121). As late as the 1880s, according to Johnson and Johanningmeier (1972), for teacher educators at one midwestern state university, "the problem was gaining *entry* into a new academic world, the gaining of some rude presence on campus" (p. 444). This was a period of Beginnings in teacher education. Earlier historians of this period detail who led the charge and what they were able and unable to accomplish, while the works of more recent historians explore why these developments unfolded as they did and how they affected people's lives. Both approaches reveal important aspects of teacher education's beginnings.

Top-down earlier scholarship provides invaluable details on the first advocates of teacher education, the establishment of various institutions and pedagogical courses, and early theories and approaches to teacher training. Gordy (1891), Elsabee

(1939/1970), and Mattingly (1975) point to the school run by Congregational minister Samuel R. Hall in Concord, Vermont, from 1823 to 1830 as the first US institution devoted to teacher training. Gordy explains: “Without a book or a periodical on the subject of education to guide him, he had to rely entirely on his own reflections and experience in his pedagogical instruction” (p. 12). While Hall labored in Vermont, James G. Carter, the Rev. Thomas H. Gallaudet, the Rev. Charles Brooks, and others campaigned for teacher seminaries along the lines of those established earlier in Prussia. In Massachusetts, Carter published a series of essays in 1824–1825 to which “leading newspapers all over the country called attention” (Gordy, p. 13), (unsuccessfully) petitioned the state legislature in 1827 to fund a teacher-training institution, won election to the state legislature in 1835, and went on to chair the committee on education and help convince his colleagues to pass an act establishing state-supported normal schools in 1838.

Despite their best efforts, advocates of freestanding, permanent institutions often had to settle, at least for a time, for short-term teachers’ institutes and normal programs housed in existing academies. Elsbree (1939/1970) reports that Henry Barnard established the first teachers’ institute in Hartford, Connecticut, in 1839, and by the mid-1840s, states from Rhode Island to Illinois sponsored institutes, which convened in a central location for a few weeks to upgrade the skills of practicing teachers. Mattingly (1975) is one of the only earlier historians to acknowledge Emma Willard’s work with Barnard to make the Hartford institute more permanent. He argues that by the late 1840s, institutes were “the most prevalent teacher preparatory agency in America and touched the lives of more teachers than any other educational institution” (p. 71). Mattingly also notes that, following his venture in Vermont, Hall accepted an invitation from Phillips Academy in Andover, Massachusetts, to establish a teacher-training program there, but the undertaking was “somewhat less than successful” (p. 32) and soon ended. Harper (1939) states that New York State supported teacher education in existing academies between the mid-1830s and mid-1840s because “the educational establishment was prejudiced against starting a new type of school” (p. 40). To Gordy (1891), this arrangement was a mistake, as “institutions which undertake the training of teachers should make that their sole business” (p. 120).

Considering their assessment of teacher education in academies, it is hardly surprising that these historians devote a great deal of attention to the rise of state normal schools. Elsbree (1939/1970) begins with an etymology lesson: “The term ‘normal school,’ which was used by the French and derived from the Latin noun *norma*—meaning ‘a carpenter’s square, a rule, a pattern, a model’—was not common in the United States until” the third decade of the nineteenth century (p. 145). Not all normal institutions were run by the state. Elsbree dismisses private normal schools as inferior, but his passing comment that in the nineteenth century they were “slightly more numerous than public institutions” (pp. 312–313) suggests that they played an important role and deserve more scholarly attention. He and others (e.g., Pangburn, 1932) discuss municipal normal schools in a little more detail, outlining their appearance in cities including Boston, New York, Newark, Philadelphia, Baltimore, St. Louis, and San Francisco by the 1860s, but historians of teacher

education pay far more attention to state institutions. Haberman and Stinnett (1973) summarize early scholarship in their account of the “state normal school movement” (p. 30); they trace the idea to Europe and outline its spread to Massachusetts in the late 1830s, other eastern states in the 1840s and 1850s, and Michigan and then other midwestern states beginning in the 1850s. “By 1875,” they report, “the [state] normal schools had established themselves as the main source of teachers for the common schools. The enthusiastic acceptance of normal schools in the West helped to enhance their general acceptance” (p. 38).

The account of the movement presented by Haberman and Stinnett (1973) and the historians who preceded them is largely the story of the men who shepherded state legislation and who led the fledgling institutions. Perhaps “the single greatest influence” (Haberman & Stinnett, p. 31), Horace Mann was the staunch advocate and defender of state normal schools in the Massachusetts legislature even against an 1840 bill to abolish the institutions and against charges that he was trying to “Prussianize” the schools (Borrowman, 1956). Henry Barnard led the way in Connecticut and Rhode Island. Harper (1939) profiles “the sons of Bridgewater,” a group of 26 men who studied under Principal Nicholas Tillinghast at the state normal in Bridgewater, Massachusetts, between 1840 and 1853, and then “carried the flame of Bridgewater fire” (p. 28) to states from Maine to California, where they served as normal-school principals. In Harper’s *Development of the Teachers College in the United States, With Special Reference to the Illinois State Normal University* (1935), the first two chapters provide extensive details on the establishment of Illinois State Normal University, including who proposed, supported, and opposed various bills in the state legislature. Harper (1935) describes how normal-school crusader Simeon Wright, retiring Superintendent of Public Schools N. W. Edwards, and others in the mid-1850s “organized their forces and proved themselves very skillful lobbyists” (p. 18) in winning over the Illinois Democratic House leader and outlines the provisions of the bill that passed in 1857, including the board of education’s charge to “fix the permanent location of the said Normal University ‘at the place where the most favorable inducements are offered’” (p. 20). Harper goes on to introduce the 15 members of the board and describe the process through which different communities submitted bids. Led by “born promoter” (p. 25) Jesse Fell, the booming town of Bloomington amassed donations of money and land to secure the institution for “North Bloomington which later became the town of Normal” (p. 29), indicating the significance of the school’s establishment there.

Harper (1935) focuses on Illinois State Normal University in order to illuminate the broader history of state normal schools (later teachers colleges) throughout the country, yet he generally follows the administrative-history approach of the romantic school of institutional history, which presents a college’s history mainly within a framework of presidential administrations and usually without much attention to the national context (Goodchild & Huk, 1990). This approach is very common, especially in early histories of individual state normal schools (e.g., Bohi, 1968; Boyden, 1933; Cain, 1941; Cates, 1968; Dedman, 1969; Fowler, 1949; Graver, 1955; Isbell, 1971; Marshall, 1956; Park, 1960; Reed, 1948; Reuter, 1963; Rogers, 1961; Ryle, 1972; Wright, 1926). Harper and other normal-school historians present biographies of

successive presidents – often called principals at normal schools – and describe prominent campus issues mainly within the context of their administrations. While it has drawbacks, this approach nonetheless provides rich details on the background and motivations of administrative decision-making. For example, in the chapter entitled simply “Richard Edwards,” Harper describes Edwards’ years as a district-school teacher, a student of and assistant teacher under Tillinghast at Bridgewater, the founder of the state normal school in Salem, Massachusetts, and the first principal of St. Louis’ city normal. Harper also quotes Edwards’ writing to delineate the evolution of his thinking on the purpose of normal schools, clarifying Illinois Normal’s blending of the methods focus typical of eastern normals with expanded academic subjects that grew from the interests of midwestern society; this program took shape during Edwards’ presidency from 1862 to 1876.

In his wider history of education leadership during the nineteenth century, Mattingly (1975) links shifts in teacher education to the differences between two generations of “schoolmen,” those who were active from 1830 to 1860 and from 1860 to 1890. He argues that the first generation was generally well-educated and contained many trained ministers, a fact which shaped its professional philosophy based on character, and that the second generation’s generally less-privileged background shaped its focus on imparting specific teaching skills. Mattingly (1975), Harper (1935, 1939), and other historians also discuss the students who attended state normal schools, describing them mainly in terms of what the institutions provided for them; the principals and to some extent the faculty, not the students, are the main actors in these top-down histories. Although it overlooks important perspectives, this approach does help to explain how teacher education became institutionalized by the 1880s. Mattingly emphasizes that the second generation’s focus was on routinizing the first generation’s views of character through skill training in regularized coursework. Harper (1935) notes lingering opposition to state-supported normal institutions, as the Illinois legislature in the early 1870s considered bills to discontinue state funding. He reports, however, that in Edwards’ final year in office, Illinois Normal “was able to launch such an aggressive campaign, and to show so conclusively its services to the State, that never again was there such a direct attack upon it” (p. 94).

Beyond covering state normal schools, many early historians mention the appearance of teacher education at colleges and universities in the mid-nineteenth century, viewing it from an even higher vantage point. They list the first universities to establish departments or professorships in pedagogy: the University of Iowa trained teachers in a “normal” department from 1855 to 1873, and the University of Wisconsin’s Department of Normal Instruction met with only “indifferent success” between its opening in 1862 and merger with the Female College in 1869 (Harper, 1939, p. 93); Iowa then founded “the first permanent department” of pedagogy in 1873 (Gordy, 1891, p. 99); the University of Michigan established a professorship in 1879; and Wisconsin, North Carolina, and Johns Hopkins followed in the early 1880s. By 1890, Elsbree (1939/1970) summarizes, “there were 114 colleges and universities out of a total of 400 that enrolled students in teachers’ courses.” These were “approximately 8 per cent of all the students enrolled in the

400 collegiate institutions. Thirty-one universities had chairs of didactics by 1892” (p. 320). Elsbree also devotes a chapter to summer schools for practicing teachers, explaining how they originated in the 1870s at seaside locations, as part of the Chautauqua Institute, and on a few college campuses; by the early 1890s, universities including Wisconsin, Indiana, and Cornell relied on their summer-school enrollments. While this bird’s-eye view reveals the broad scope of change, these historians rarely discuss the individuals involved in providing, let alone receiving, teacher education at colleges and universities.

In their history of teacher preparation at the University of Illinois, Johnson and Johanningsmeier (1972) offer a rare extended discussion of the efforts of leaders at one institution to establish teacher education, and the picture that emerges is one of continuing uncertainty. Illinois’ first president, John Milton Gregory, had a long-standing interest in teacher preparation; the catalog described the second semester of his 1869 course in “mental and moral philosophy” as “including the ‘Science of Education, or mental philosophy as applied to Education’” (p. 30). For the next two decades, the description of a fourth-year philosophy course mentioned education, but Gregory and the president who replaced him looked mainly to the state’s normal schools and teachers’ institutes for teacher preparation. Holder of a German doctorate and respected education scholar Charles DeGarmo joined the Illinois faculty as chair of psychology and pedagogy in 1890. Johnson and Johanningsmeier explain that the course catalog for 1890–1891 reflected his presence with the addition of a 2-year program in teacher education. After DeGarmo resigned in 1891, however, education at Illinois continued to experience false starts; “for DeGarmo and his immediate successors, the problem was gaining *entry* into a new academic world” (p. 444).

Borrowman (1965) provides the wider context for education’s struggle to gain such entry, describing universities’ gradual acceptance of more utilitarian subjects, such as science and engineering, beginning in the eighteenth century and the rise of the elective system during the second half of the nineteenth century. “Somehow, in this remodeling process, rooms labeled ‘Education’ appeared. Since then, the contentious family that manages the house has argued incessantly and passionately” (p. 7). On one level, the argument was about whether it was necessary or even possible to train people to teach, an issue that also fed opposition to state support for normal schools. Harper (1939) explains, “The normal schools were harassed for years by ... those who claimed that anyone who knew a subject could teach it” (p. 108). On another level, the argument was about whether teacher education was somehow too utilitarian and thus beneath the dignity of colleges. “In a meeting of the New England Association of Colleges in 1889,” Harper reports, “it was asserted that pedagogical training was a handicap to their work and was ‘liable to infringe upon and diminish’ the true work of the college” (p. 113). Borrowman (1956, 1965) focuses on yet another level of the argument: “about whether *education* belongs in the house as a liberal art or science” (1965, p. 7) or what was the appropriate balance of liberal and technical preparation for teaching. Harper adds that the normal schools were also “harassed” for providing general instruction by those “who believed that the normals should offer nothing except methods and

education courses” (p. 108). The argument persisted on all of these levels through the 1880s and beyond at least in part because the field was struggling to establish its content or some form of theory of education.

The top-down perspective of early historians provides an overview of the fledgling content of teacher education, mainly at state normal schools, as it developed beginning in the 1820s. Before 1860, according to Williamson (1936), “there was little conscious recognition of the need for a general theory of education” (p. 15). The “first important American book on pedagogy” (Elsbree, 1939/1970, p. 226), Samuel Hall’s *Lectures on Schoolkeeping*, appeared in 1829. In it, Hall summarized his lectures to students at his Vermont school on a wide range of topics, including responsibilities of teachers and how to teach various subjects. More texts appeared in the 1830s and 1840s but were “overwhelmingly concerned with instruction in techniques” (Borrowman, 1956, p. 67). At many normal schools, model or practice elementary-level schools reinforced practical instruction in techniques; Harper (1939) emphasizes that the model school was “the center” of the state normal school in Trenton, New Jersey, from its opening in 1855 (p. 64). Students there and at other normals observed their teachers’ model lessons first and then tried their hand in the classroom. It was not until the 1850s at Westfield State Normal School in Massachusetts that a theory, based on the philosophy of the renowned Swiss educator Johann Heinrich Pestalozzi, began to take shape. In short, Pestalozzianism held that children learn best through their senses and that teaching should therefore utilize the senses. Westfield began “collecting such objects, illustrative apparatus and reference books, as were necessary for a thorough system of objective teaching and study” (Gordy, 1891, p. 60). The seeds planted at Westfield flowered in the “Oswego movement” of the 1860s–1870s, which Williamson argues marked the beginning of educational theory. The efforts of Principal Edward A. Sheldon of New York’s Oswego State Normal School to develop and spread instruction in “object teaching,” or how to create lessons based on explorations of physical things, are prominent in virtually all early histories of teacher education, which emphasize that normal-school students throughout the country learned the Oswego method.

In his chapter entitled “The Development of Method,” Elsbree (1939/1970) acknowledges the importance of the Oswego movement in making teachers “active instructors” (p. 395) who should engage in lesson planning, yet argues that the approach “led only too naturally to a stilted methodology” (p. 396). In turn, he and other historians report, a new, more sophisticated theory became prominent in teacher-education curricula at both normal schools and universities beginning in the late 1880s. According to Harper (1939), the philosophy of German educator Johann Friedrich Herbart caused “a tidal wave of reform in educational theory and practice which occurred between 1886 and 1900” (p. 124). Herbartianism stressed lesson planning through five formal steps based on children’s interests, planting the seeds for the growth of educational psychology. While they state that the Oswego method and then Herbartianism increasingly shaped methods instruction and practice teaching, historians of teacher education also acknowledge the less technical areas of early teacher education. Gordy (1891), for example, reports that students preparing for teaching at the University of Iowa in the early 1880s took courses in “History of

education” and “National systems of education,” as well as “Practical education topics,” “School economy” (which included school organization, supervision, and management), and “School supervision” (pp. 100–101). Such courses would not even have been possible when Hall began training teachers in Vermont in the 1820s. In seven decades, state normal schools and the field of education had established themselves, albeit, as Hunt (1956) observes, the “progress of professional training seems to have been painfully slow” (p. 25).

Most early historians trace initial advocacy for teacher education, the establishment of various institutions and pedagogical courses, and the first theories and approaches to teacher training in the context of what Ginsburg (1987) terms “professionalization projects” (p. 7), with the implicit assumption that teaching was on a certain path toward full-fledged professional status. For example, Harper (1939) introduces his discussion of normal schools in the 1840s and 1850s by stating that they “were moving along in these two decades in a crusade to produce a *profession* of teaching” (p. 39) and lists as their first contribution later in nineteenth century that “the normal schools were transforming teaching into a profession” (p. 113). Even when Elsbree (1939/1970) acknowledges that “early attempts at teacher training appear crude when judged by present day standards” he is quick to point out that they nevertheless “established a precedent which was destined to have far-reaching consequences” (p. 154). He even entitles the section in which he discusses the post-Civil War normal school and teacher education in universities, “The Emergence of the Professional Teacher” (p. 307). Borrowman (1965) offers a less positive assessment – acknowledging that in some eyes the normal school was “a symbol of illiberal study and excessive technicalism” (20) – but he still addresses professionalization, writing that the normal school “deserves the principal credit for establishing the ideal that teaching ... should command the prestige and commitment to service usually characterized as ‘professional’” (p. 19). With a top-down orientation, these historians focus on what was important to leaders in teacher education: professionalization.

Within the professionalization framework, some early historians also acknowledge status issues, as well as class and gender distinctions, but they stop short of analyzing their roles in shaping teacher education. Elsbree (1939/1970) mentions that the university “departments of education were not always considered academically respectable” (320) yet does not consider the implications for the “emergence” of professionalism. After Harper (1935) lists the occupations of the parents of Illinois Normal students, his observation that “their poverty was not particularly noticeable because it was so common” (p. 101) dismisses social class as a salient issue. He also commends the institution’s pioneering role in coeducation and provides an overview of student activities, but as sidelights to the main story. Harper’s (1939) *A Century of Public Teacher Education*, like many early histories, shows almost no regard for the class background or gender of any of those involved in teacher education. Two early historians show more awareness of issues of status and gender. Borrowman (1965) notes that normal schools “recruited a class of students who had limited opportunities for advanced education elsewhere” and that “opportunities were especially meager in the case of girls” (p. 22), and Mattingly (1975)

states that class and gender differences hindered normal principals' relationships with their students. Yet, with top-down perspectives, even these authors make the issues peripheral to the professionalization story. More recent historian Christopher Lucas (1997) observes that "older accounts of the history of teacher education in the United States have tended to imply a sort of linear evolutionary development, an inexorable and somehow irresistible march of progress toward some roseate future ... Yet the historical reality, on later readings, seems far more complex and ambiguous" (p. 17). Lucas' generation of teacher-education historians complicates the professionalization question and moves beyond it.

Lucas (1997) and other more recent historians (e.g., Altenbaugh & Underwood, 1990; Hendrick, 1990; Labaree, 2004; Ogren, 2005) utilize the work of earlier scholars, amply citing them as they set the scene at the top in order to explore what went on below. Their bottom-up concerns lead to new insights on the beginnings of teacher education between the 1820s and 1880s, especially at state normal schools. For Lucas, looking past the motivations and careers of normal-school leaders dismantles the notion of progress toward professionalism. From the perspective of outside reformers, he questions "whether normal preparatory training satisfied any genuine need whatsoever" (p. 29) and states that normal schools "were increasingly looked upon with something akin to professional embarrassment" (p. 54). While Lucas certainly answers Ginsburg's (1987) call for attention to "contestation" (p. 5), he overlooks "the contradictions embedded within unequal class and gender relations" (p. 7). Considerations of social class and gender, as well as race, inform other recent scholarly examinations of state normal schools and other institutions that prepared teachers, enriching the scholarship considerably.

Class and gender inequalities underlie Jurgen Herbst's (1989a) *And Sadly Teach: Teacher Education and Professionalization in American Culture*. Through extensive analysis of original sources, Herbst retraces and deepens the story of the first attempts at teacher education, American fascination with Prussian teacher seminaries, the first normal schools in Massachusetts, and their spread to the Midwest and beyond. Like earlier scholars, he focuses on the leaders in teacher education, but he weaves gender and class analysis into his discussion. For instance, in his first chapter, a section on "Women in the Classroom" (p. 24) immediately precedes "Teacher Education: The Agitation Begins" (p. 30). Chapter two points out that American promoters of the Prussian teacher-education system, which was built on and reinforced social-class differences and served exclusively male students, ignored its incompatibility with the "commitment to a fluid, classless society" (p. 50) and women's movement into teaching and teacher education in the United States. Even as Massachusetts began to establish normal schools, leaders there "remained oblivious to the clearly apparent trend toward increasing numbers of women teachers" (p. 60). Herbst explains that these class and gender tensions played out in the mid- and late nineteenth century as the normal schools weighed the competing demands of training mostly female rural elementary-school teachers, training more advanced teachers and administrators, and offering broader academic studies. Ultimately, gender influenced the "betrayal" of teacher professionalization as most normal schools turned away from the first demand and focused on

the other two. Herbst (1989b) reflects: "Teacher education has lain at the heart of all attempts at professionalization. The history of that movement throughout the nineteenth century in particular does not present an encouraging story" (p. 213); "ambivalence," he emphasizes, "hovers over the story" (p. 214).

In the preface to *And Sadly Teach*, Herbst (1989a) says that it is out of concern for "the teachers themselves" that he investigates "the way they have been educated" (p. xi). Hoffman (1991) is not satisfied with this top-down approach, noting of Herbst's work that "the book reads in part like a male plot to dispossess women of their rights to professionalism rather than as a piece in a complex renegotiation of gender roles" (p. 84). Understanding how gender operated requires the perspectives of women normal-school students and teachers; Hoffman's critique is an indirect call for a more bottom-up history of teacher education. Altenbaugh and Underwood (1990) also argue that education reformers and normal-school principals were not the only actors in the story: "In spite of a lofty notion of teacher training as an institution's mission, the way the general public, students, and the faculty perceived the normal school shaped it more" (p. 136). Based on existing literature and case studies of ten institutions (including the state normal schools located in Fitchburg, Massachusetts; Cedar Falls, Iowa; and San Francisco, California), their overview of the "evolution" of normal schools nevertheless presents mainly a birds-eye look at leadership, enrollment patterns, and institutional functions, albeit with attention to gender and race issues. Altenbaugh and Underwood agree with Herbst that "Nineteenth-century normal schools bequeathed an ambivalent legacy" (p. 143).

Ogren (2000, 2005) further interrogates this ambivalent legacy in her in-depth examination of state normal schools, arguing that nineteenth-century social norms defining "professionals" as male and genteel meant that "women and anyone from a lower-class background—the majority of teachers—would not gain acceptance as professionals ... To overcome teaching's legacy of low status would have been a tall order for any institution; failure in this regard did not mean that the normal schools were unsuccessful in creating a strong professional spirit" (2005, p. 122). Unlike most historians of teacher education, Ogren (2000, 2005) focuses on the students or "normalites." *The American State Normal School: "An Instrument of Great Good"* (2005) analyzes normalites' experiences in the context of teacher education, as well as higher education more broadly. Amid discussions of local efforts to host the institutions, students' lower-class rural backgrounds and enthusiasm for learning, the general academic curriculum, and student involvement in activities from literary societies to athletics, Ogren (2005) presents a wide-angle look at how normalites prepared for teaching. In the early decades, she explains, the schools' offerings in pedagogy were rather thin and model schools were understaffed in inadequate facilities, but students explored topics related to teaching in their fledgling organizations. By the 1870s, when state normal schools entered their heyday, pedagogical instruction included practical and abstract considerations of methods and school management, as well as psychology, and history and philosophy of education. Most normalites spent time observing the teaching of their professors and peers and apprentice teaching; they discussed their observations at length and received extensive

criticism of their own teaching. Meanwhile, in their newspapers, clubs, and literary societies, students further cultivated their teaching skills and examined the field more broadly. They published lesson plans and debated issues such as compulsory education, coeducation, and “Resolved that the practical part of an education is more beneficial to society than the Literary part” (p. 145). Thus, in their heyday, state normal schools enabled students “to view themselves as professionals during a time when society was reluctant to grant this status to women (and people from lower social classes)” (p. 150).

Analysis of the normal schools in terms of their students’ gender and social class leads Ogren (2005), as well as Herbst (1980, 1989a), and Altenbaugh and Underwood (1990) to argue that they “were the pioneers of higher education for the people” (Herbst, 1980, p. 227). Desperate for teachers as public education systems expanded, states waived tuition and even covered travel expenses for normalites who committed to teach following graduation, with the unintended consequence of significantly expanding educational access. In his institutional history of the normal school in Westfield, Massachusetts, Brown (1988) argues “that a significant percentage of the student body had a hunger for education, as much of it as they could get, and that they used that education in the best American mythic model, as a tool for social and economic advancement.” In addition, “normal schools played a significant role in the history of American women” (p. xv). While other recent institutional histories of state normal schools (e.g., Edmonds, Bruce, & Geelhoed, 2001; Nye, 2001; Skopp, 1989) tend to take a traditional top-down approach, Brown’s more bottom-up perspective reveals important new dimensions of teacher education. Fraser (2007) reflects that normal schools “played many different roles for many different people and groups in their century of existence. No wonder the history of these institutions has been subject to so much confusion and debate” (p. 115).

More steeped in women’s history than earlier historians, Ogren (2000, 2005) and Fraser (2007) acknowledge the important role that women’s academies and seminaries played in preparing women to teach in the early to mid-nineteenth century. Established in the 1820s and 1830s, Emma Willard’s Troy Seminary in New York State, Catharine Beecher’s Hartford Seminary in Connecticut, and Mary Lyon’s Mount Holyoke Seminary in Massachusetts all incorporated teacher education as one of their primary missions. Lyon even reduced tuition for women of limited means who intended to become teachers. Based on the Mount Holyoke model, Cherokee Female Seminary in Oklahoma began preparing teachers in the early 1850s; it was one of many “daughter schools” of Mount Holyoke, Troy, and Hartford that educated women teachers. Instead of offering courses in pedagogy, Willard at Troy discussed her methods as she taught academic subjects and had the more advanced students demonstrate their learning by teaching other students. Over time, she developed an advanced and highly respected teacher-placement network. Fraser states that these female seminaries “were arguably the first professional schools for teachers in the United States” (p. 29) and also points out that as seminaries and academies gave way to public high schools in the mid- and late nineteenth century, the high schools often included normal courses: “Sometimes the normal curriculum

was limited to girls, and in many schools in the early years it was the only secondary program open to girls. But it was an essential part of many high schools in all parts of the United States" (p. 81).

In addition to gender and social class, some recent historians of teacher education add race as a category of analysis, usually by discussing southern institutions that prepared African-American teachers after the Civil War. James Anderson (1988) led the way; in his broader history of *The Education of Blacks in the South, 1860–1935*, he devotes a chapter to the "Hampton-Tuskegee Idea," an approach to teacher training developed by Samuel C. Armstrong at Hampton Institute in Virginia and his protégé Booker T. Washington at Tuskegee Institute in Alabama. The curriculum they developed combined elementary academic instruction, manual and agricultural work, and social discipline to "mold appropriately conservative black teachers" (p. 36). The institutes' mission was to train teachers of vocational education who would then train African-American workers. Anderson explains that despite "suspicion and resentment by significant segments of the black community" (p. 58), during the 1880s financial support from the John F. Slater Fund enabled this system of teacher education to spread to segregated black institutions throughout the South. Cruikshank (1990) writes about the post-Civil War origins of Georgia's Augusta Institute, Albany Normal School, and Atlanta University, all of which shared a mission of preparing black teachers. By 1882, the latter institution offered a "higher normal course" ... modeled on normal schools in the North" (p. 343). Turning to the North, Perkins' (1989) essay on the history of African-American teachers describes how, as principal of the Institute for Colored Youth in Philadelphia from 1865 through the turn of the century, Fanny Jackson Coppin prepared students to teach in poorly equipped, segregated rural elementary schools by teaching them to improvise their own educational aids, such as by drawing their own maps. In addition, Collins' (2011) history of race and the selection of teachers in New York City points out that the city's all-female municipal normal school, which opened in 1870, was distinctive in its accessibility to black students. President Thomas Hunter, for whom the institution would later be named, "was quite proud of his college's racial diversity" (p. 18).

Building on these examinations of different approaches and institutions, Altenbaugh and Underwood (1990), Ogren (2005), and Fraser (2007) incorporate normal schools for African-American students into their wider histories of normal schools and teacher education. Ogren, for example, discusses the curriculum and student activities at the Branch Normal College in Pine Bluff, Arkansas, to demonstrate that, in many ways, black and majority-white normal schools were more similar than different. Fraser includes a chapter on the preparation of African-American teachers in the South in which he describes informal education even before the end of the Civil War, the Hampton-Tuskegee model, the wide range of other colleges and normal schools founded by missionary and philanthropic groups, and other undertakings through the early twentieth century. He concludes by quoting Anderson on the great challenge black colleges – and thus, teacher educators – faced in balancing the northern philanthropists' support for the Hampton-Tuskegee approach with black southerners' desires for dignity and rights. While there is much room for

additional scholarship in this area, analysis of race, like gender and social class, adds an important dimension to the historiography of teacher education.

Recent historians pay far less attention to teacher preparation in colleges and universities than in normal schools between the 1820s and the 1880s. Like earlier scholars, Powell (1980) and Clifford and Guthrie (1988) present a birds-eye view of the first courses and departments. Both also briefly discuss the work of Professor William H. Payne at the University of Michigan in the 1880s, mainly in order to distinguish how the nascent university approach differed from the normal-school approach to educating teachers. Powell explains that Payne avoided practical instruction, as the “secret to achieving professional status was to emphasize the complex principles that constituted educational science”; he “tried to teach only theory” (p. 41). In her history of educational research, Lagemann (2000) explains that Payne was thus one of the first to face “the enduring dilemma for scholars of education”: the way to earn respect in the university was through the traditional disciplines, but students “wanted ‘recipes for practice’” (p. 179). Hendrick (1990) and Allison (1998) both extend the discussion by considering teacher education in relation to the Morrill Land Grant Act of 1862. Hendrick points out that teacher preparation was absent from discussions of the Act and from the curricula of early land-grant institutions, and Allison’s in-depth examination of teacher education at the University of Tennessee demonstrates how the land-grant designation served to further complicate teacher education’s rocky entry into the institution. The Tennessee faculty had been ambivalent toward teacher education as it “periodically created and abandoned teacher education programs” beginning in the 1840s (p. x); becoming a land-grant institution intensified tensions between the faculty’s commitment to classical education and the state’s interest in practical instruction, including in education. Yet when the need for students and state appropriations carried the most weight, such as in the mid-1880s, the institution offered a short-lived teachers’ course.

While Allison (1998), Powell (1980), and Lagemann (2000) discuss how status consciousness affected early teacher preparation at Michigan and Tennessee, David Labaree’s (2004) main focus is the low status of university education schools, mainly in the present. Arguing that the history of teacher education has contributed to *The Trouble with Ed Schools*, he locates the issue in the nineteenth-century normal schools, basically overlooking the history of teacher preparation in nineteenth-century universities, perhaps because work on the latter is limited. The scholarship that does exist, however, demonstrates that pedagogical education in universities confronted different issues than the normal schools and even tried to distance itself from the normals’ approach, suggesting that further research in this area would enhance the historiography of teacher education significantly.

Reflecting on the study he codirected of the history of teacher education in the nineteenth and twentieth centuries, John Goodlad (1990) lists emerging themes including “Stability and Instability” (p. 18), “The Search for Institutional Identity” (p. 20), and “The Knowledge-Practice Tension” (p. 32). These themes are evident throughout the scholarship on teacher education between the 1820s and 1880s. In an essay accompanying Goodlad’s, Levin (1990) adds gender as a theme, arguing that normal schools’ status issues were inseparable from the fact that the majority of

their students were women. Recent scholarship confirms Levin's point in relation to normal schools; historians of teacher education need to ask similar questions regarding teacher education at colleges and universities. Recent scholars' bottom-up questions have fostered new understandings of the roles played by gender, social class, and race in the history of nineteenth-century teacher preparation, mainly at normal schools and other noncollegiate institutions. This work suggests that larger social forces worked against the evolution of teaching as a profession and thus that the institutions' "professionalization projects" (Ginsburg, 1987, p. 7) do not capture the whole story. Indeed, "ambivalence ... hovers over the story" (Herbst, 1989b, p. 214) of teacher education in the nineteenth century and beyond.

1890s–1930s: Transitions

As modernization and a sense of progress flowered during the last decade of the nineteenth and the opening decades of the twentieth century, a credentials-based "culture of professionalism" (Bledstein, 1976) defined the newly powerful American middle class, which engaged in a "search for order" (Wiebe, 1967) through bureaucratization. In public education, this meant that states and districts began to enforce teacher certification more strictly and to increase educational qualifications for certification (Altenbaugh & Underwood, 1990; Elsbree, 1939/1970; Fraser, 2007). In the larger system of K-12 and higher education, order meant differentiating the rungs on the ladder through accreditation (Fraser). At the same time, high-school enrollments grew tremendously, increasing the number of graduates in the higher education pool and enlarging the market for training high-school teachers. Influenced by these changes, this was a period of Transitions in teacher education.

Synthesis of the diffuse literature on teacher preparation between the 1890s and the 1930s reveals three related yet distinct transitions. First, the normal schools transformed themselves into teachers colleges. In this case, as in the literature on the Beginnings period, the works of earlier historians focus on the agendas and accomplishments of institutional leaders while the works of more recent historians incorporate wider social influences and effects. The second and third transitions occurred in colleges and universities, which earlier scholars tend to view monolithically. More extensive research and somewhat deeper consideration of societal issues by more recent historians illuminates important distinctions between prestigious research universities and less research-oriented institutions. In the second transition, schools of education at research universities shifted their focus from teacher preparation to the training of school administrators, graduate studies, and educational research, while in the third transition, teacher preparation at other colleges and universities transitioned from uncertainty to legitimacy.

Most state normal schools gained college standing during this period. In 1890, the New York State Normal School at Albany changed its name to Normal College and announced its intention to train high-school teachers (Elsbree, 1939/1970). The institution in Ypsilanti, Michigan, followed suit in 1899; the one in Cedar

Falls, Iowa, renamed itself Iowa State Teachers College in 1909; and by 1913, nine state normal schools in various states had become teachers colleges (Ogren, 2005; Pangburn, 1932). During the 1920s, the majority of state normals – including those in Pennsylvania, Alabama, Kansas, Wisconsin, and California – became teachers colleges (Ogren), and by 1930, most normal schools/teachers colleges required high-school graduation for admission and offered 4 years of studies at the college level (Elsbree). By 1940, according to Woodring (1975), “the term ‘normal school’ had become obsolete” (p. 4). It is hardly surprising that Harper (1935) calls the 1900–1930 presidency of David Felmley at Illinois State Normal University “the ‘era of transition’ ... from the normal school to the teachers college. This was a struggle for expansion and recognition. There was grave danger that the normal school would be left stranded, high and dry, on the bank of the great current of national education” (p. 277). To most early historians of teacher education, the story of the half century following the Albany institution’s name change is primarily the story of the rise of the teachers college. Later scholars focus on other aspects of the transition, but to Harper (1935, 1939) and other early historians, the most important developments during this period were institutional leaders’ accomplishments in gaining accreditation and expanding the curriculum to college grade, thus ensuring that the former normal schools would remain afloat in “the great current” of education.

Harper (1935) argues that the normal schools’ transition depended on competing “in the field of preparation of high school teachers,” which required “securing recognition and respect from state universities” (which also desired a large share of the market to prepare high-school teachers) and working out “a suitable relationship to the agencies which were already highly developed in the field of standardizing college education” (p. 321). Thus, Felmley and other leaders’ work within voluntary associations was, according to Hunt (1956), key to improving teacher education and institutional status. Normal schools had “found themselves ostracized by the regional accrediting associations” (Haberman & Stinnett, 1973, p. 175), but in the 1890s, the “new and vigorous leadership” (Hunt, p. 27) of the Normal Department of the National Education Association began to turn around this relationship. The Department’s 1908 “‘statement of policy’ ... was really a program for making the transition from normal schools to teachers colleges” (Haberman & Stinnett, p. 46) through adherence to uniform standards. Meanwhile, the North Central Council of Normal School Presidents formed in 1902, becoming a national organization in 1917. The American Association of Teachers Colleges formed in 1918, incorporated the North Central Council in 1923, and replaced the Normal Department when it disbanded in 1925 (Harper, 1939; Hunt, 1956). Largely through conducting surveys of normal schools/teachers colleges and publicizing their results and standards, the Council and Association “succeeded in bringing the teachers colleges into an acceptable position with the already highly developed accrediting agencies” (Harper, 1939, p. 145). Once they won the right to grant bachelor’s degrees, the teachers colleges had to decide whether they should grant the standard B.S. or A.B. or a newly created professional degree such as the Bachelor of Education.

In the curricular expansion that accompanied the normal-school to teachers-college transition, Borrowman (1956) observes that “the trend seems to have been to lean over backwards in adding courses of the kind which other colleges would approve” (p. 130). This meant general academic courses, more refined work in educational theory, and differentiated professional curricula. Herbartianism remained the focus of theory work at many institutions into the twentieth century; Harper (1935) points out that the Illinois Normal faculty continued to refine Herbartian theory, using it to upgrade students’ work in the practice school and connecting it with the child-study movement. Pangburn (1932) explains that developments in psychology increasingly influenced and expanded professional curricula. At first, “curricula of different lengths began to lead to different positions, the shorter curricula leading to rural teaching, the longest ones leading to high school teaching” and the bachelor’s degree. Later, curricula “of the same length but of differing content prepared for different teaching positions” (p. 50). For example, the Trenton, New Jersey, state normal in the first two decades of the twentieth century maintained its elementary education program and added parallel curricula in physical education, industrial arts, commercial education, and music. These programs were 2, then 3, years in length. After it gained authorization to grant the B.S. degree in 1925, Trenton added a 4-year course for high-school teaching (Harper, 1939). Wofford (1935) and Elsbree (1939/1970) report that by the 1910s, many institutions added specialized programs for rural teaching; students in these programs did general work in psychology, child study, and methods but also took “science, including agriculture and nature study, rural sociology, and rural-school management” (Wofford, p. 90). Thus, as the normal schools worked toward collegiate status, they found ways to differentiate their curricula.

These historians’ focus on accreditation and curricular expansion is important because it explains how the normal schools were able to make a place for themselves on the college rung of the ladder of educational institutions that formalized around the turn of the twentieth century. Woodring (1975) reflects, “normal schools, even at their best, lacked status. . . . Students and faculty members in such institutions were sensitive to their lack of status and hence eager to transform the normal schools into colleges” (p. 5). Woodring likely spoke for students and faculty rather than reported their actual sentiments because he and other early historians of teacher education concentrated on institutional leaders. From this perspective, the increased status that accompanied the transition from normal school to teachers college was a huge advance in the professionalization of teacher education. More recent scholars, as in the case of their coverage of nineteenth-century normal schools, expand and complicate the story with more attention to “the contradictions embedded within unequal [race,] class and gender relations” (Ginsburg, 1987, p. 7).

Regarding race, Anderson (1988) explains that higher educational qualifications for teacher certification and the increasing importance of accreditation led mainly to a shift in the places where southern African-American teachers received their training. There were so few state normal schools for black students that their transformation into state teachers colleges – the institution in Montgomery, Alabama, for example, became a 4-year teachers college in 1928 – did not affect many students.

As the century opened, most black teachers instead received training in segregated secondary and private normal schools, many of which followed the Hampton-Tuskegee approach. When these institutions were unable to meet higher standards, the students went to private colleges instead. In this case, “state certification requirements and student aspirations converged to shape long-run trends away from the industrial normal” model (p. 145).

In *And Sadly Teach*, Herbst (1989a) emphasizes that gender concerns underlay Felmley’s efforts to transform Illinois Normal into a teachers college: “Felmley’s commitment to professionalization was spurred on by what he perceived as the steady progress of feminization throughout education” (p. 147). Troubled by increasing percentages of women teachers and their growing dominance in the market, he argued that more advanced offerings, new specialties, and higher degrees would attract more male students, bringing more men into teaching. Felmley thus led the way in betraying the professional interests of female elementary teachers. In his analysis of normal schools, schools of education, and teachers unions at the turn of the twentieth century, Gitlin (1996) also argues that the normal schools’ transformation was motivated by gender and had adverse effects on professionalization. After “men and especially male administrators” (p. 596) increasingly criticized the normal schools’ traditional emphasis on teaching experience as a source of expertise, the effort to attract more men by the 1910s included “moving away from practical experience and emphasizing hiring more research-oriented faculty” (p. 599). While this aided in gaining collegiate status, “the professional mission of the normal school became fragmented, with most of the men showing little or no interest in teaching” (p. 599). Levin (1994) illustrates this fragmentation in his case study of Keene State Normal School in New Hampshire, which by the 1910s included household arts courses for female students, suggesting “a view of schooling with respect to gender roles that makes the young woman the purveyor of organization, taste, and personal responsibility for others” (p. 93). With support from the federal Smith-Hughes Act of 1917, Keene expanded its preparation of high-school vocational teachers in separate, gendered curricular tracks and became a teachers college in 1939.

Ogren (2005) and Markowitz (1993) also use gender, social class, and race/ethnicity as categories of analysis as they expand and complicate the story of the normal-school to teachers-college transition by focusing on student experiences. While the institutions’ leaders began agitating for change in the 1890s, Ogren finds that the heyday of the state normal school as a distinct institution lasted into the 1910s. She argues that normalites, most of whom were women and from rural lower-class backgrounds and some of whom were from minority racial or ethnic groups, flourished intellectually and socially – although they increasingly desired to earn bachelor’s degrees. The curriculum and extracurriculum also combined to create a shared professional culture; one principal remarked on “the ozone of teaching which permeates the atmosphere of the Normal School” (p. 122). Like Herbst (1989a), Gitlin (1996), and Levin (1994), Ogren (2005) argues that the teachers-college transition diminished this sense of professionalism. By the 1910s, she argues, these institutions began to emulate colleges’ differentiated curricula and football-oriented campus life, introducing gender segregation and displacing “the

ozone of teaching.” “In transforming themselves into teachers colleges,” Ogren summarizes, “normal schools erased qualities that had made them distinctive, all in the interest of institutional status” (p. 209). Fraser (2007) adds that in enforcing “standards and expectations for themselves, the normal schools also ceased to be normal schools” (p. 130).

In her history of Jewish teachers in New York City, Markowitz (1993) discusses the preparation of second-generation Jewish immigrants for teaching during the interwar years.¹ Because they were Jewish and often from lower-class backgrounds, these women were not welcome at private colleges. In the 1920s, most attended one of three two-year city normal or “training” schools – the Maxwell, New York, or Jamaica Training School for Teachers – which for “these women intending to teach in the city’s elementary schools ... were the most attractive option available. Besides offering free professional training, the schools provided direct preparation for the examination for the teacher’s license,” had model schools, and even allowed students to earn “paid remuneration as student teachers” (p. 21). These “subway schools” also had many student clubs and organizations, although many students’ work and family responsibilities precluded participation. While her intention is not to evaluate institutional teachers-college transitions, Markowitz suggests that the results were not all positive. After the three training schools became colleges in 1930 in a Depression-influenced effort to reduce enrollments and then closed in 1933, most Jewish women aspiring to be teachers attended either Hunter College, the all-female counterpart to City College established in 1870, or Brooklyn College of the City of New York, established in 1930. Teacher preparation at these colleges required a semester of student teaching, yet opportunities were limited and hard to arrange. In addition, the college faculty members and administrators often reacted negatively to the Jewish students’ outspokenness and activism and occasionally refused to endorse particular students as teaching candidates. Similarly, Fraser (2007) outlines

¹ Her extensive discussion of teacher preparation distinguishes Markowitz’s (1993) work from most histories of women teachers, which mention teacher preparation but do not cover it in great detail. For example, Rousmaniere (1997) mentions educational requirements for New York City teachers in the 1920s but does not delve into their training experiences. Weiler’s (1998) history of women teachers in rural California from the mid-nineteenth to the mid-twentieth century includes a short profile of the state’s normal schools as “in many respects women-centered institutions” (p. 51) and a brief description of the private normal school that many of Tulare County’s teachers attended in the late 1870s and 1880s; her biographical summaries of individual teachers also mention when they attended normal school or teachers college. Cordier’s (1992) history of women teachers in Iowa, Kansas, and Nebraska in the late nineteenth and early twentieth centuries includes a chapter on their education, which provides an overview of teacher examinations, teachers institutes, teachers’ self-instruction, and different types of normal schools in the three states. In his history of teachers of freed people during and following the Civil War, Butchart’s (2010) introduction of the black and white teachers from the North and South briefly mentions their educational backgrounds, and he also summarizes the establishment of normal schools and normal classes in larger schools for southern blacks. Kaufman (1984) and Hoffman (2003) both provide brief overviews of teacher education in their introductions to primary-source documents on women teachers’ experiences; Hoffman (2003) also includes an excerpt of the journal of Mary Swift, a member of the first class at state normal school in Lexington, Massachusetts, in 1839.

the influence of local conditions on the transition of the city normal schools into teachers colleges in Detroit and Chicago as well as New York in the 1920s and 1930s, reflecting that the change increased standards for future elementary and secondary teachers yet ultimately diminished the colleges' focus on preparing teachers. From the perspective of teacher-education students, then, the transition to teachers-college status was not necessarily as beneficial as the institutions' leaders suggested.

Normal schools/teachers colleges were not the only institutions that stood to benefit from the growing need for high-school teachers in the late nineteenth and early twentieth centuries; this growing need also contributed to transitions in teacher education at colleges and universities during this period. After tentative beginnings in the 1850s through 1880s, colleges and universities expanded their work in teacher education, even unabashedly asserting their superiority over the normal schools in an effort to corner the market (Lagemann, 2000). In discussing teacher preparation at this level, earlier historians make few distinctions between types of colleges and universities, an omission that obscures these transitions in early scholarship. For example, when Harper (1935) describes opposition to Illinois Normal's moves to prepare secondary teachers, he mentions both small colleges' and larger universities' desires to capture most of the students. Elsbree (1939/1970) adds that the "functions of departments of education in colleges and universities have been extended beyond the mere preparation of secondary-school teachers" (p. 333) without naming particular institutions or types, which suggests that all experienced the same trends. Borrowman (1956) distinguishes only between the liberal-arts tradition of colleges and universities and the more technical tradition of normal schools/teachers colleges but observes that in both cases the "real issues have been hopelessly entangled with status ones" (p. 2). Two important case studies by Borrowman's contemporaries – Cremin, Shannon, and Townsend (1954) on Teachers College and Johnson and Johanningmeier (1972) on education at the University of Illinois – demonstrate that status issues played out differently at different universities, setting the stage for more recent scholarship which suggests two different transitions in this period: from undergraduate teacher preparation to graduate studies and research at prestigious research universities like Teachers College and from uncertainty to legitimacy for undergraduate teacher preparation at less research-oriented colleges and universities like the University of Illinois.

In terms of the more prestigious institutions, Cremin et al. (1954) begin with this claim: "The history of Teachers College, Columbia University, since its founding in 1887, is the history of American teacher education writ small ... [T]he College ... has been in the forefront of every major movement, issue, and conflict in American education" (p. v). They go on to trace Teachers College's origins as the practically oriented, coeducational New York College for the Training of Teachers, its later affiliation with all-male Columbia in 1893, and the somewhat uneasy relationship that followed. In the face of "the hostile attitude of some members of the University Faculty toward Teachers College itself, toward all courses in education, and toward the presence of women in higher education" (p. 70), the college became by Dean James E. Russell's retirement in 1927 "primarily a graduate professional school

preparing students for every sort of educational work available” (p. 114). Under Dean William F. Russell, the college inaugurated the Doctorate in Education, or Ed.D., degree in 1934 and organized the Advanced School of Education in 1935 to bring together researchers from different disciplinary backgrounds. As the college affiliated with various local schools, the faculty sought to create not model schools but laboratories for “experimental study of problems and methods” (p. 111). Cremin et al. profile the research of professors including Paul Monroe, Edward Thorndike, John Dewey, William Heard Kilpatrick, and Patty Smith Hill, as well as controversies over communists on the faculty during the Depression; “Teachers College during the 1930s,” they report, “was news” (p. 171). This high profile certainly validates their claim that the Teachers College was “at the forefront.” However, the work of other historians confirms that it belonged to an elite group and thus hardly represented the history of teacher education “writ small.”

In *The Uncertain Profession: Harvard and the Search for Educational Authority*, Powell (1980) profiles another member of this elite group, demonstrating how Harvard’s focus on attracting students and enhancing prestige determined education’s trajectory there. After President Charles W. Eliot inaugurated limited preparation of high-school teachers and appointed Paul Henry Hanus to coordinate instruction in the 1890s, Hanus soon turned to graduate-level training of administrators as “a haven from collegial attack as well as a new source of students and influence” (p. 64). Seeking to emulate the prestigious programs at Teachers College and the University of Chicago as well as to serve President A. Lawrence Lowell’s aspirations, in the 1910s, Hanus and his rising colleague Henry W. Holmes prioritized educational research and measurement. Then, to maintain a spot in the training market, the newly created Graduate School of Education in the 1920s turned its enrollment efforts first to practicing teachers looking to earn advanced degrees – the school created the doctor of education degree because Lowell would not allow it to grant the Ph.D. – and then to young liberal-arts graduates to whom it offered 2 years of teacher preparation culminating in a master’s degree in education. Holmes worked to justify these new programs in the face of fears of “feminization” due to their popularity with Radcliffe women and of criticism by researchers like Chicago’s Charles Judd, who “roundly attacked Harvard’s continuing obsession with practitioner training” (p. 160). After Lowell retired in 1933, he remarked “that the Graduate School of Education was like a ‘kitten that ought to be drowned’” (p. 176). Harvard’s new president, James B. Conant, did not eliminate the school but instead concentrated on creating the master of arts in teaching, which he argued would boost Harvard’s prestige through a more rigorous and selective approach to teacher education.

Clifford and Guthrie (1988) define the elite group to which Harvard and Teachers College belonged as those listed by the Committee on Graduate Instruction of the American Council on Education in 1934 as “the ‘most distinguished’ schools of education” (p. 52). Also on the list were Chicago, Stanford, the University of California (Berkeley), Ohio State, Iowa, Michigan, Minnesota, and Yale. Arguing that such institutions “have become ensnared improvidently in the academic and political cultures of their institutions and have neglected their professional allegiances” (p. 3) to the

schools, Clifford and Guthrie devote the first half of their book to explaining how this entanglement came to be between 1900 and 1940. First, tensions between academic and vocational education resulted in a theoretical rather than a practical focus and, in many cases, a retreat from teacher preparation altogether as “status considerations” (p. 95) tipped the scale toward acceptance of practical education only for future school administrators. Public institutions often retained skeletal teacher-education programs to satisfy public relations and consumer demands, even for women’s education. “Gender was both a problem and another reason to admit pedagogy into the university curriculum... [T]he presence of women helped to sustain the arts and letters departments” (p. 126), where future high-school teachers gained subject-matter knowledge. “Early on, and in their own ways, then, the prestige schools of education either eliminated teacher education or confined it to a limited and peripheral role ... Education schools focused professionalism on those who were *leaving* teaching” (p. 115). Clifford and Guthrie’s argument parallels those of Herbst (1989a) and Gitlin (1996). Herbst, for instance, turns after his lengthy discussion of the normal schools’ “betrayal of the teacher” (p. 161) to a brief account of the elite schools of education, concluding “professionalization everywhere meant the neglect and banishment of the classroom teacher” (p. 182).

Clifford and Guthrie (1988) next examine tensions on campus over prestige differences between various schools and colleges, as well as the effect this had on relations with teachers. Abandoning or marginalizing teacher education did not eliminate the “enmity” (p. 135) or, in the words of US Education Commissioner Elmer Ellsworth Brown, “simply unbelievable distrust and opposition” (p. 136) that colleges of education faced on elite campuses. As faculty in other departments “repeatedly and insistently questioned the very existence and sometimes even the possibility, of worthwhile, much less *essential* knowledge in the art and science of teaching” (p. 146), educational researchers faced an uphill battle for respect. It is hardly surprising, then, that Lagemann’s (2000) *An Elusive Science: The Troubling History of Education Research* emphasizes early researchers’ low regard for classroom teachers. As he developed the field of child study, G. Stanley Hall “tended to avoid close contact with teachers, especially if they were women” (p. 31). Edward L. Thorndike, a giant in educational psychology, defined teaching as technical and subordinate, asserting that “teachers should come to understand their place in the educational hierarchy” (p. 60). In contrast, teachers at John Dewey’s Laboratory School at Chicago were collaborators in research; but when Dewey left the university in 1904, Judd quickly instituted a more hierarchical structure. Even more distant from teachers, school surveyors and testing researchers helped to establish a research-based “science for school administration” (p. 94) by the 1920s. During the interwar years, educational researchers including Harold Rugg, William Heard Kilpatrick, and Jesse H. Newlon focused on curricular issues. Although Newlon and others saw benefits in teacher participation, approaches like that of Paul Hanna won out: “social studies as developed by Hanna tried to guarantee that teachers would not be able even to set the parameters of the curricula they taught” (p. 128).

Lagemann (2000) and others demonstrate that for all their efforts to distance themselves from teachers, these researchers and education faculty members could

not escape the status problems associated with the gender as well as the social-class background of the majority of teachers, problems which threatened to devalue educational researchers' own standing. "Especially at elite eastern universities, the association of education with 'woman's work' marginalized the new 'ed schools,'" writes Lagemann. "Ironically, of course, these were the very same patterns of disdain and discount that had given universities an advantage relative to normal schools in the competition for control of the high school and administrator training market" (p. 16). After turning away from teacher education and still finding acceptance by their academic colleagues to be elusive, colleges of education at elite research universities were nevertheless able to influence the schools through curriculum, standardized testing, and administrative practice. Clifford and Guthrie (1988) agree with Johnson (1989): "The ultimate influence of the twentieth-century university school of education, then, has less to do with forging a distinctive role in the training of teachers than in the way that educational research has helped to shape the conditions of professional practice" (p. 253). Clifford and Guthrie also assert that these elite colleges of education "rose to become models" for others and that their culture "spread to similar universities, and even to essentially dissimilar institutions" (p. 47).

The work of other scholars, however, demonstrates that many colleges and universities underwent a very different transition as they did not turn away from but instead strengthened their commitment to teacher preparation between the 1890s and 1930s. These institutions included the University of Illinois. Johnson and Johanningmeier (1972) lay the groundwork for more recent scholarship on teacher education at colleges and universities that were less research-oriented at least before 1940. They argue that after education managed to gain entry into Illinois by the 1890s, the next task was "to demonstrate the *legitimacy* of a new area of inquiry and service," which came to be "grudgingly accepted on the campus" (p. 444). In the 1900s and 1910s, the chairs of pedagogy and directors of education gradually added graduate work in administration and conducted some research but focused mainly on shoring up teacher preparation, including assuring others on campus that it was of a higher grade than normal-school work. In his 1910 plan for the School of Education, William Chandler Bagley said little about research, although he noted in a 1911 editorial "that provisions for educational research were needed" (p. 183). As director of the newly created school, one of Bagley's main campaigns was for a new practice school, which he said was to be primarily for teacher training and only secondarily for experimentation. In the late 1910s, Illinois added teacher-preparation programs in home economics, industrial education, and agriculture under the auspices of the Smith-Hughes Act. Under a new dean in the 1920s, the school placed more importance on graduate work, and under Dean Charles Eliot Benner in the 1930s, education faculty members repeatedly asked the University for more research support. At the same time, Benner worked to reorganize teacher education to increase its effectiveness. Unlike their counterparts at more prestigious universities, Benner and his faculty valued research and preparing administrators, but never lost sight of teacher preparation.

More recent case studies of education at universities including Pittsburgh and Tennessee also demonstrate that teacher preparation gained legitimacy and grudging

acceptance, while status issues remained ever present. Levin's (1994) analysis of education at the University of Pittsburgh begins with its establishment of the School of Education in 1910. During the school's first decade, it was more oriented "to regional service than to national trend-setting" (p. 26), which meant it "blended both university and normal-school traditions and philosophies" (p. 27). In this blend, those studying and teaching elementary education had lower status than others in the school, not to mention the university in general. During the 1920s, Levin explains, university traditions came to dominate the school, as it suspended the elementary department and made psychology the focus of methods courses. But the school did resume preparing elementary teachers, even as research began to play a bigger role and graduate studies grew. In 1939, master's outnumbered bachelor's graduates in education for the first time; but, rather than marginalize teacher education, Pittsburgh in the 1930s worked to produce teachers who were reflective practitioners through "what a good blending of discipline-based and professional faculty could offer" (p. 47).

Allison (1998) describes a rockier path for teacher education at the University of Tennessee; however, this was not due to the rise of research or graduate programs because Tennessee had neither until after World War II. Allison emphasizes that the university, which became coeducational in the early 1890s, continuously produced teachers even as it established the Teachers' Department in 1891, closed it in 1896, opened the Department of Education in 1903, and then let its faculty numbers dwindle. The trustees and administration stressed that each of these departments "was in 'no sense a Normal Department'" (p. 27); courses "emphasized a scholarly and theoretical study of education" (p. 57). In the 1900s and 1910s, northern philanthropy underwrote the Summer School of the South; these sessions on the Tennessee campus provided instruction for tens of thousands of southern teachers and helped to sustain the education department. Tennessee – like Vanderbilt (Boyles, 2003) – competed fiercely with Nashville's Peabody College for educational philanthropy and benefitted from the General Education Board's funding of professorships in secondary education at Tennessee as well as other southern universities beginning in the 1910s. This philanthropy helped to make education a more permanent, if uneasy, resident of the university by the 1920s and 1930s. The department became the College of Education in 1926 and survived the retrenchment of the 1930s with a faculty "campaign to prove their worth to the university and the state" (p. 133).

In her study of the history of teacher education at private universities, Beatty (1990) finds a "combination of caution and opportunism" that could also characterize the approaches of Illinois, Pittsburgh, and Tennessee: "The linked themes of reluctance to embrace teacher education, its low status compared to that of the traditional academic disciplines, the need to generate tuition, and service to schools converged" (p. 187). The institutions she refers to as national universities, such as Emory and Boston University, experienced slow growth in education with some opposition from liberal-arts faculty members, but their teacher-education programs were fairly well entrenched by the late 1930s. Beatty also profiles regional universities, where, she writes, "there was less evidence of prejudices against teacher education than was found in the major national universities, and in some of these places teacher

education was accepted eagerly and wholeheartedly” (p. 193). For example, Drake University offered extensive teacher preparation from the time it acquired a private normal school in 1888; this program evolved into Drake’s College of Education. Hendrick’s (1990) analysis of teacher education at a group of universities including Oklahoma State, Penn State, Temple, Georgia, and Georgia State echoes Beatty: “Evidence here suggests that intrauniversity conflict between liberal arts faculty and education faculties, while real, was not a continuing or particularly intense problem” (263).

Beatty’s (1990) characterization of regional universities also fits the few smaller colleges that historians of teacher education discuss. Burgess (1990) profiles several liberal-arts colleges, demonstrating in most cases that teacher training was prominent, not controversial, and assumed a permanent position in the institutional structure. At Coe College, for example, pedagogy was first housed in the Department of Philosophy and Political Science. The 1899–1900 catalog affirmed, “the History and Science of Education is worthy of the same intelligent study that is accorded to other subjects in the curriculum” (p. 114), and the Department of Education was established in 1906. Similarly, Bucknell included education in the philosophy department and then moved it to its own department in 1915. Bucknell also began a teacher-placement service. At Mills, a women’s college, President Aurelia Henry Reinhardt’s ideal faculty had “a devotion to teaching on their part and a supportive attitude toward Mills students who aspired to be schoolteachers” (p. 101). During her presidency from 1916 to 1943, Reinhardt headed the education department and inaugurated a summer school for teachers. Teacher education was also a prominent and well-established function of black colleges in the South (Anderson, 1988; Perkins, 1989). At colleges and many universities outside the research elite, preparing teachers remained part of the mission and entrenched itself in the institutional structure by the 1930s; unlike their more prestigious counterparts, these institutions did not back away from teacher education.

While colleges and nonelite universities strengthened their commitment to teacher preparation between the 1890s and 1930s, schools of education at prestigious research universities instead focused increasingly on administrator training, graduate education, and research; at the same time, state normal schools transformed themselves into teachers colleges. While early historians view the latter transition as a positive development for teachers’ professional status, more recent historians disagree and point out negative changes in students’ experiences on campus. Recent historians also suggest that the elite universities’ gravitation toward graduate work and research in education was detrimental to teacher professionalization. While other historians’ investigations of colleges and less research-oriented universities make an important scholarly contribution in delineating them from research universities, they need to look more deeply at the wider effects of teacher preparation at these institutions on the profession. They could consider, for example, whether holding degrees from non-prestigious colleges or universities versus from teachers colleges influenced teachers’ status and respect. Crucial questions of status, gender, and class inform recent historians’ writing on all three transitions. Only analysis of the normal-school to teachers-college transition, however, includes in-depth looks

at the bottom-up issue of what the changes meant for students. Examination of student experiences as they prepared for teaching at different types of universities and colleges would also enhance scholarly understanding of the institutional transitions that set the stage for mid- and late-twentieth-century approaches to teacher education.

1940s–2000: Upgrading Amid Disfavor

Altenbaugh and Underwood (1990) suggest that “teacher training institutions have always walked a tightrope, trying to attract students to maintain and increase enrollments, to please state legislatures, to enjoy continued tax support, and to maintain the standards outlined by various accreditation groups. And they have had to walk that tightrope amid larger social forces” (p. 161). Between the 1940s and the turn of the twenty-first century, larger societal developments made walking the tightrope especially challenging. The post-World War II baby boom intensified the need for teachers and, in turn, Americans’ focus on the nation’s schools. The Cold War and then the civil rights movement stoked criticism of public schools, and this criticism, in the pattern outlined by Warren (1985), came to rest on teacher education. The economic downturn of the 1970s and the rise of the accountability movement brought further scrutiny to the preparation of the nation’s teachers. As Levin (1994) argues, “reconceptualizing teacher education” became “a component of school reform” (p. vii).

Warren (1985) also observes that “a steady lengthening and upgrading of teacher education” (p. 10) continued throughout the twentieth century. Following the state normal schools’ transition into teachers colleges and the strengthening of nonelite colleges’ and universities’ commitment to teacher education, by midcentury, it became “an almost universal requirement across the United States, in urban and rural areas, and rich and poor states, that every teacher, virtually without exception, was expected to have a college degree”; in fact, by 1960, all 50 states required a bachelor’s degree for high-school teaching, and by 1964, 46 states required a bachelor’s for elementary teaching as well (Fraser, 2007, p. 189). The state governments that determined credential requirements, along with the National Council for Accreditation of Teacher Education, or NCATE, gained increasing authority over teacher-preparation programs. Yet, Warren further observes, “no one could be confident that greater amounts of teacher education ... had a positive impact on teachers’ performance in the classroom” (p. 10). Teacher education had long “seemed to be in perpetual disfavor” (p. 11), and this disfavor played out on the national stage between the 1940s and 2000. Thus, this was a period of Upgrading Amid Disfavor in teacher education. Most of the historical research on this period is relatively recent. While it is top-heavy in its focus on national debates and institutional developments, this scholarship generally foregrounds issues of status and social inequality. As a result, scholarship on the history of teacher education during this period mainly questions the effectiveness of institutional upgrades, explains

and critiques the critics of and reforms in teacher education, and points out the elitism behind efforts to recruit supposedly better teachers and to bypass traditional certification.

Two of the earlier transitions continued into the mid- to late twentieth century, resulting in institutional upgrades that historians demonstrate were in many respects downgrades for teacher preparation. First, the once normal schools experienced another transformation, as state teachers colleges first became multipurpose state colleges and then, later, state universities. For instance, California's state teachers colleges became simply state colleges as early as 1935, and their programs changed accordingly. By the mid-1940s, San Francisco State College had programs in liberal arts, business, and social service in addition to education (Altenbaugh & Underwood, 1990). After passage of the G.I. Bill and the end of World War II in 1945, veterans seeking higher education swelled enrollments and greatly accelerated teachers colleges' transformation (Haberman & Stinnett, 1973; Lucas, 1997). Colorado State College of Education in Greeley scrambled to meet the varied academic interests of new students as enrollment tripled between 1944 and 1948; it became Colorado State College in 1957 and then the University of Northern Colorado in 1970 (Altenbaugh & Underwood). Typical of eastern institutions, Fitchburg State Teachers College in Massachusetts added new programs more gradually in liberal arts, engineering, and business and became a state college in 1960 (Altenbaugh & Underwood). Pennsylvania's state teachers colleges, which faced periodic politically motivated opposition to their existence, received praise for serving large numbers of veterans in the late 1940s (Eisenmann, 1990) and became state colleges in 1959/1960 and then state universities in 1983. Woodring (1975) explains that once they became multipurpose, these institutions prepared rapidly declining proportions of their graduates for teaching, but their enrollments increased so rapidly in the 1950s and 1960s that the actual numbers of certified teachers among their graduates nonetheless continued to increase. The American Association of Teachers Colleges disappeared in 1948, when it merged with two other groups to become the American Association of Colleges for Teacher Education (Bigelow, 1957; Hunt, 1956). "By 1970," Woodring confirms, "the single-purpose teachers college had become almost as obsolete as the normal school" (p. 5).

Early historian of teacher education Harper (1939) expressed concern that "teachers colleges faced a real crisis in the danger of aping the liberal arts colleges and thereby losing those distinctive characteristics upon which the state teacher-education institutions were originally founded" (p. 130), and more recent historians confirm that his concern was well-founded. Altenbaugh and Underwood (1990) argue that after teachers colleges adopted "the university pattern, teacher preparation did not fare well" (p. 152). At Pennsylvania's former teachers colleges, Eisenmann (1990) found that "faculty members who served in the 1950s and 1960s lamented the loss of focus on the teacher training mission." At West Chester, they said it had been "'wonderful' working with these students, especially in an atmosphere that was 'ingrained with teaching.' After the shift to university status, the faculty at West Chester noticed a huge loss of power and purpose in the education programs" (p. 304). In New Hampshire, as Keene raised faculty qualifications

before and after becoming a state college in 1963, the number of professors with doctorates in academic subjects rose while those with experience and expertise in elementary education “nearly disappeared” (Levin, 1994, p. 144). Observing an effect of gender, Altenbaugh and Underwood add, “as the institutions became more multipurpose, they also grew more masculine—in both students and faculty” (p. 179). While normal schools and teachers colleges had been low-status institutions, Labaree (2004) argues, the “incorporation of teacher education within the university meant that the tendency to stratify teacher education functions now became an internal matter defining the relationships between university departments. The result was that teacher education came to occupy a marginal status in the academic hierarchy of the university” (p. 33).

The other institutional transformation that continued after 1940 was the increasing focus on graduate studies and research. At Harvard – which had been more hesitant than other elite institutions to abandon practitioner training – the emphasis under new education dean Francis Keppel was squarely on research, specifically using the social sciences to understand “how social forces have shaped education’s impact” (Powell, 1980, p. 242). Powell observes that “By 1950 research was regarded as a specialized occupation remote from practice. Explicit practitioner training seemed almost antithetical to an ideal research environment” (p. 243). Although it soon returned to an elite version of teacher preparation, Harvard maintained its commitment to “the advancement of scholarly disciplines related to education” (p. 272).

Not only did research continue to overshadow teacher preparation in schools of education at elite institutions, but many more education schools adopted a research orientation. The upper echelon expanded only slightly, as Clifford and Guthrie (1988) report that the schools of education at the universities of Illinois, Wisconsin, and California at Los Angeles (which had originated as a state normal school) joined the top ranks by the 1980s (and Yale dropped out of the education elite after dissolving its education department in the 1950s). But also during this period, these elite colleges of education “rose to become models” and their culture “spread to similar universities, and even to essentially dissimilar institutions” (p. 47). According to Clifford and Guthrie, the number of universities that awarded doctorates in education nearly doubled between 1960 and 1977, to 153. They also note, “education professors knew that preparing more graduate students in education would restore some balance to gender ratios in their student bodies. Male graduate students would compensate for the masses of young women” (p. 173).

In addition to outlining wider gender ramifications, historians of education demonstrate how upgrades in institutional status meant downgrades for teacher preparation at particular universities, even those where teacher preparation had gained legitimacy and some acceptance prior to the 1940s. At the University of Pittsburgh’s School of Education, research achieved a higher profile by the 1940s and 1950s, resulting in “a schism between research and pre-service education rather than a constructive interplay between the two” (Levin, 1994, p. 58). At the University of Tennessee, from the 1940s and 1950s, when the College of Education developed its graduate programs, through the 1980s, when the education faculty decreased

its service and consulting work in favor of peer-reviewed publication, teacher education “remained on the defensive, always trying to redefine and often trying to reinvent itself” (Allison, 1998, p. 184). Beatty (1990) similarly observes that as research activities expanded between the “boom years of the 1950s through the early 1970s ... preservice teacher education in private universities became increasingly problematic” (p. 192). Even regional Drake University opened a new Graduate School of Education and Human Services in the 1980s; as a result, undergraduate teacher education “has shrunk and been relegated to a backwater, where it receives little attention or support” (p. 209). In the group of state universities he investigated, Hendrick (1990) found: “Not only did teacher educators become isolated from those who pursued research questions, but those who engaged in research became substantially isolated from everyone except other researchers. At bottom, the problem became one of a confused mission” (p. 271). Not surprisingly, Fraser (2007) writes that countless reports and commentaries on teacher education in the latter decades of the twentieth century “found the university-based schools of education—and nearly all teachers were being prepared in such programs—in a state of intellectual disarray” (p. 222).

Education schools surely deserved some criticism in the second half of the twentieth century, but historians of teacher education argue that they received more than their share. According to Fraser (2007), “teacher education programs came under intense scrutiny and, indeed, attack, some informed and thoughtful, some vicious and mean-spirited” (p. 207). By the late 1940s and especially after the Soviet Union’s launch of the satellite Sputnik in 1957, critics charged that American public schools had become insipid and lax and thus presented a threat to national security in a time of Cold War. “Within this climate, it was perhaps not surprising that scholars of education were blamed for having encouraged ... ‘mushy education’” (Lagemann, 2000, p. 160). In his 1953 book *Quackery in the Public Schools*, Albert Lynd accused educational methodology of being “90 percent mixed humbug and wind” (Lucas, 1997, p. 70). Lucas (1997) and Fraser (2007) discuss the more serious critiques in the most detail, focusing first on Arthur Bestor’s widely read 1953 book *Educational Wastelands*, which indicted teacher education in its extensive critique of the public schools. Bestor charged that faculty in the liberal arts had ignored educational issues while “educationists” had created narrowly vocational programs that lacked rigor; “Bestor believed it was time ‘to open the valves and let some of the gas out of the over-inflated educational balloon’” (Lucas, p. 71). According to Fraser, Bestor “had outlined what would be the core of most critiques of teacher education for the coming half-century” (p. 209).

Two books published in 1963 “shook the world of teacher education to its roots” (Fraser, 2007, p. 209): former Harvard president James B. Conant’s *The Education of American Teachers* and James D. Koerner’s *The Miseducation of American Teachers*. Like Bestor, Koerner argued that education students spent too much time in vacuous pedagogy courses; education did not have a sufficient body of knowledge to warrant disciplinary status, and its faculty was of “‘inferior intellectual quality’” (Fraser, p. 211). Lucas (1997) and Fraser (2007) agree that Conant’s critique was more reasoned and well-informed. Although he was sympathetic to

education professors' complaints about constant attacks, Conant was critical of their scholarship, some of which he said could "be labeled anti-intellectual" (Fraser, p. 212). Conant argued "that the 'science' of education was largely chimerical" (Lucas, p. 78) and that "promoting teaching competence ... should be accepted as the responsibility of the institution as a whole, not just its education faculty" (p. 80). He urged further experimentation, reducing the power of NCATE and state overseers, recruiting stronger students into teaching, and suggested that teacher-preparation programs require more credits in liberal arts and fewer in pedagogy.

Bestor, Koerner, and Conant embody the disfavor toward teacher education in the 1950s and 1960s. Yet Fraser (2007) finds it "amazing ... how very little impact these reports had on the actual practices on college campuses or on the actual experience of those preparing for careers in teaching. The reports sold by the thousands. They were discussed across the country. And not much happened" (pp. 213–214). These critiques of teacher education had stemmed from scrutiny of the public schools, and this scrutiny did contribute to new efforts to upgrade educational research – by involving non-educationists. Lagemann (2000) explains that the federal government and organizations such as the American Association for the Advancement of Science and the Ford Foundation supported research led by discipline-based scholars on how to improve K-12 curricula. For example, with funding from the Carnegie Corporation, University of Illinois mathematics professor Max Beberman led a committee composed mainly of university mathematicians who developed "new math" by infusing discovery and abstractions into the curriculum. "Publicly, Beberman described the project as a result of 'the combined efforts of mathematicians and teachers.' Privately, however, he presented the project as an effort to develop materials that could not be corrupted by 'the average teacher'" (pp. 167–168). At the same time, education schools hired more scholars trained in the academic disciplines, including the social sciences. While their discipline-based research "gained in academic standing," Lagemann argues, "it was now said to be less directly relevant to the field" (p. 161). This new research had little impact on teacher preparation; into the 1970s, Lucas (1997) observes, "innovations in teacher education," such as "microteaching" and competency- or performance-based approaches "were taken up and as quickly discarded in rapid succession" (p. 83).

Perhaps because the critiques of the 1950s and 1960s had little effect, "exceedingly little has changed in the language of teacher education's toughest critics in subsequent decades" (Fraser, 2007, p. 213). Lucas (1997) cites later books, such as Rita Kramer's 1991 *Ed School Follies*, which echoed earlier critiques, and quotes esteemed educational psychologist Seymour B. Sarason's observation in his 1993 book that "it is truly remarkable how cosmetic the changes have been" in teacher education (p. 89). Lucas summarizes: "The most common measures called for to remedy teacher education since the late 1940s had now grown predictable: more stringent admissions standards, better screening of teacher applicants, an increase in the number of academic courses required ... " (p. 90).

Although they clearly did not stem the tide of criticism, two 1986 reports on how to reform teacher education and the teaching profession did result in limited implementation of these measures. *A Nation Prepared* by the Carnegie Forum on Education

and the Economy and *Tomorrow's Teachers* by the Holmes Group of Education Deans moved beyond critique to outline solutions to teacher education's supposed problems. Johnson (1987) writes that while the Carnegie Forum's members were closely tied to business and government and the Holmes Group's members were education deans at research universities, they agreed on "substantially increasing the academic preparation of teachers. Both reports recommend that the undergraduate major in education be abolished and that all prospective teachers earn the baccalaureate degree, including an academic major, before beginning professional training" (pp. 222–223). Although undergraduate work in education did not disappear, Fraser (2007) observes that other reforms "were implemented at breakneck speed in the 1980s," specifically, "a required major in a liberal arts discipline, the strengthening of clinical experiences, and the raising of academic standards" (p. 225).

These and later reports, as well as training programs, were uneven in their treatment of race. Fraser (2007) points out that the Carnegie Forum called for recruitment of "minority youngsters for teaching careers" (p. 229), while the Holmes Group's 1986 report did not mention race in relation to teacher preparation. By the late 1970s and early 1980s, the numbers of African-American teachers and students in teacher-preparation programs were dropping precipitously as other professional opportunities became more available (Perkins, 1989). The Holmes Group emphasized enhancement of "equity and diversity" (p. 231) in the additional reports it published in 1990 and 1995 and created the Holmes Scholars program to support doctoral students of color. Collins (2011) argues that, as part of "the institutional network that controlled teacher selection" (p. 6), teacher education programs in New York and other cities had long filtered out minority candidates; in the 1960s and 1970s, intensifying criticism charged New York's municipal colleges with excluding black and Puerto Rican students, as well as with neglecting to prepare future teachers to work with minority students. A debate soon raged over whether affirmative action in admissions to teacher training "represented a *lowering* of admissions standards, as opponents of these reforms charged, or an *updating* of admissions standards, one that supporters argued would allow the university to identify minority students' latent talents and, hopefully, give them the opportunity to use those talents as teachers in the city's classrooms" (p. 31). Regardless of whether these policies lowered or updated standards, however, they did little to increase the diversity of the teaching force as other reform efforts focused on different types of candidates.

Upgrading teacher education and the profession in the second half of the twentieth century also meant recruiting presumably better candidates and bypassing rather than reforming traditional teacher education. Critical of underlying assumptions that higher social-class origins would enhance teachers' professional status, historians of this period point out the elitist undertones, and even overtones, of these efforts, beginning with creation of the master of arts in teaching and other fifth-year programs, which originated at Harvard and Teachers College. After Conant piloted the M.A.T. at Harvard, Teachers College in the early 1940s began a cooperative program with Columbia, Barnard, and other elite liberal-arts colleges to ease the path for their students into teaching. They completed undergraduate degrees in the

liberal arts and then pursued a year of intensive work in the social sciences, education, and practice teaching at Teachers College to earn a master's degree (Cremin et al. 1954). With support from the Ford Foundation, Dean Keppel reinvigorated Harvard's M.A.T program in the 1950s. Powell (1980) explains, "Keppel defined the personnel problem in education as one of recruitment rather than of training. He resolved to attract to the School a larger number of graduates from the best liberal arts colleges" with an eye toward "how social class factors affected the composition of the profession and the content of schooling" (pp. 244–245). When TheodoreSizer replaced Keppel in 1962, "the School was firmly committed to elite practitioner recruitment" (p. 272).

Beyond Harvard, the Ford Foundation invested in fifth-year programs throughout the country. The proposal for one of the biggest, at the University of Arkansas, described "a program of teacher education based upon a four-year program of broad liberal education to be followed by a period of combined internship and professional study as a requirement for certification" (Fraser, 2007, p. 200). The Arkansas program began in 1952 along with Ford's support of fifth-year programs, the majority of which granted the M.A.T., at 29 other institutions including Brown and Johns Hopkins. Clifford and Guthrie (1988) report that in their first 5 years, these programs prepared approximately 550 high-school teachers. At Harvard and elsewhere, Fraser observes, M.A.T. programs "recruited those who by both background and accomplishment reflected the elite of the nation. By 1960, 242 of the 293 students in the [Harvard] program were graduates of the most prominent of the nation's private universities" (p. 205). In addition, the "M.A.T. not only drew from the well-off, it served the well-off" (p. 205) as most graduates went on to teach in wealthy school districts. Such an outcome was increasingly unpopular in the climate of President Lyndon Johnson's War on Poverty in the 1960s, and most M.A.T. programs disappeared after their Ford grants – along with the post-baby boom teacher shortage – ended in the early 1970s.

Other efforts to recruit "better people" into teaching were even further removed from traditional teacher-preparation programs. Originating in the 1965 Higher Education Act, the National Teacher Corps was a War on Poverty effort to place "the best and brightest" young people as teachers in impoverished urban and rural classrooms throughout the country. Rogers (2009) writes: "The architects of the NTC presumed that successful teaching in the most challenging classrooms required intrinsic qualities, a liberal arts education, and an understanding of the 'disadvantaged.' The rest, they expected, could be learned on the job" (p. 348). These "intrinsic" personal qualities included "character (idealistic, altruistic, and spirited), elite education, class background, and shared politics" (p. 351). The first Corps interns were mainly graduates of elite institutions, and fewer than 15% had majored in education. They participated in a summer training session and then spent 2 years apprentice teaching and volunteering in the community. Although designers of the Teacher Corps were suspicious of "the notion of professional training itself" (p. 348), interns also completed masters-level university coursework in education. A subtle goal of the program, according to Fraser (2007), was "to transform the stodgy ways of teacher education by this infusion of new blood" (p. 217). While

interns indeed challenged their university professors, they also often had trouble connecting with their students and communities. Fraser reflects: “High hopes, high ideals, and deep commitment, while terribly important, were not enough” (219). The Teacher Corps shifted focus and disappeared by the early 1980s, but the idea resurfaced when Princeton senior Wendy Kopp established Teach for America in 1990. In its first 15 years, the program provided 5 weeks of summer training and 2-year placements in low-income schools for over 12,000 elite college graduates, who took courses toward certification while working as teachers (Fraser). Teach for America, like the earlier National Teacher Corps, seeks to upgrade teacher preparation by providing far less of it – to people with desirable backgrounds.

Amid disfavor toward traditional university-based teacher education, the second half of the twentieth century witnessed the lengthening of requirements for teaching credentials to include a bachelor’s degree and the “upgrading” of institutions that prepared teachers as well as of the candidates’ backgrounds. Viewing these developments with an eye toward social inequality and status issues, historians suggest that the transformation of teachers colleges into multipurpose institutions and the spread of research in university schools of education actually downgraded teacher preparation and, further, that efforts to recruit more desirable students into programs through bypassing traditional teacher education were elitist. Their detailed analyses of institutional shifts, critiques and reform efforts, and the rise and fall of the M.A.T. and the Teacher Corps provide an excellent yet top-heavy account of the major developments in teacher education. Fraser (2007) begins each of his chapters with a short vignette profiling the preparation of an individual teacher. For instance, to illustrate institutional upgrades, he describes Thelma Pairsh’s “checkered university career” at New Mexico Normal University and the University of New Mexico (p. 173), and to capture the rise of Teach for America, he cites Sanford Johnson’s decision to teach in the Mississippi Delta after majoring in political science at Auburn University. These mere snippets call for more in-depth consideration of students’ experiences, which are generally lacking in literature on this era. Rogers (2009) refers briefly to oral histories with former Teacher Corps interns, reporting, for example, that the “evidence reveals interns’ desire for ‘more about “here’s how you actually teach reading”” (p. 371). More such bottom-up perspectives would enhance scholarship on teacher education between the 1940s and 2000.

In emphasizing the need for liberal-arts education and the importance of refined personal qualities, the criticism and reforms of teacher education during the second half of the twentieth century harkened back at least 200 years. Sanford Johnson’s undergraduate preparation for teaching was surprisingly similar to John Adams’ in the mid-eighteenth century; Johnson’s political-science major at Auburn did not require the Latin and Greek that Adams studied at Harvard, but neither man had undergraduate training in pedagogy. The years that separated Adams and Johnson, however, saw many developments across three eras: the nineteenth-century beginnings of teacher education at the new state normal schools and in fledgling college and university departments of pedagogy; the early-twentieth-century transitions of normal schools into teachers colleges, research into the predominant function of education schools at elite universities, and teacher preparation into a legitimate

function of nonelite universities; and the later-twentieth century “upgrading” of teacher education and teaching candidates amid disfavor. Writing for the most part before the criticism and reforms of the latter period, early historians of teacher education tended to assume that teaching was in the process of emerging as a profession. More recent historians have instead focused on issues other than professionalism, questioned teachers’ professional status, or critiqued education leaders’ approaches to professionalization, perhaps in part because of the disfavor they witnessed. Together, though, early and more recent historians of teacher education have produced a rich body of scholarship that has much to contribute to the historiography of higher education.

Teacher Education and the Historiography of Higher Education

Confirming Fraser’s (2007) observation that “the history of teacher education is one of the most overlooked topics in the history of American education today” (p. 2), literature on the history of higher education largely neglects the ways that teachers were prepared across various institutions. Early histories (e.g., Hofstadter & Metzger, 1955; Rudolph, 1962/1990; Veysey, 1965) acknowledge teacher preparation only peripherally, and most recent works have continued in this vein. In his widely read history, Rudolph reports that college-educated clergymen served as teachers in the colonial period and early republic and that “by the end of the nineteenth century, American colleges and universities were producing more teachers than anything else” (p. 339), but these are essentially side notes in his larger story. Rudolph’s (1977) history of the college curriculum similarly acknowledges colleges’ role in preparing teachers but with little elaboration aside from his observation that the rise of pedagogy as a field of study initially “left the colleges stranded” by their “decision to back away from involvement in the development in a profession of schoolteachers” (p. 179) and his inclusion of university education departments merely as one example of the enlargement of vocationalism after 1900. Four decades later, Thelin’s (2004) comprehensive history of American higher education similarly mentions only in passing that many college graduates became teachers. He also discusses normal schools but in a separate, self-contained section of a chapter. Teacher education remains an isolated strand which is not woven into the larger history.

Thelin’s (2004) book reflects the proliferation in the last few decades of literature on the history of higher education. Historians have advanced scholarly understanding of *sites*, *students*, *scholarship*, and the larger *structures* that have shaped colleges and universities, especially during the nineteenth and twentieth centuries (Ogren, 2008). The history of teacher education has much to offer in these areas, and deeper consideration of the role of teacher education would do much to further historians’ overall analyses. For instance, the rise and evolution of the American Association of Teachers Colleges in the early twentieth century (Bigelow, 1957; Hunt, 1956) and the Ford Foundation’s support of M.A.T. programs

in the mid-twentieth century (Clifford & Guthrie, 1988) demonstrate the influence of two important types of *structures*: accreditation associations and philanthropic foundations. Similarly, education's acrimonious entry into the curriculum and "troubling history" as a research field (Lagemann, 2000) raise central issues related to *scholarship*. Johnson and Johanningmeier (1972) reflect: "Perhaps no other discipline or field of study—and the issue was in part whether pedagogy represented a legitimate discipline or field—suffered more acrimonious and puzzling entry into the charmed circle of higher studies" (p. 447). While historians of higher education have made especially good progress in incorporating the experiences of students from underrepresented groups and better understanding nineteenth-century colleges and twentieth-century institutional hierarchies, it is in the areas of *students* and *sites* that the historiography of teacher education has the most to contribute to the historiography of higher education.

Students

Since the 1970s, much of the historiography of higher education has focused on the attendance and experiences of students who were women, from minority racial and ethnic groups, and/or of low socioeconomic status. Because disproportionate numbers of these students sought to become teachers, it is hardly surprising that their histories pay more attention to teacher education than older and overview histories. Still, these works pay uneven attention to teacher preparation's importance in motivating their attendance and shaping their college experiences as well as the structure of the institutions.

Regarding women and higher education, Barbara Miller Solomon's (1985) now classic history sets the tone. She acknowledges teacher preparation as a powerful argument for institutions to admit women – producing teachers benefitted society – and as a draw for women to attend – they could prepare for a marginally middle-class, respectable occupation. Solomon also acknowledges teaching as the career destination of the majority of female graduates through the early twentieth century, but seems almost disappointed in these women, writing, "education surpassed by far any other professional field employing women ... Why did the college woman still turn to what had become the most traditional option?" (pp. 127–128). Beyond women students' motivations and career destinations, however, Solomon does not delve into whether or how teacher education shaped their college experiences or the institutions themselves, suggesting that whether they were preparing to teach was irrelevant.

Following Solomon (1985), Gordon (1990) barely mentions teacher education in her portraits of college women at five coeducational and all-female institutions during the Progressive Era. She explains that when Dean Lucy Sprague arrived at the University of California at Berkeley in 1906, "she polled women students about their career choices and discovered that 90 percent planned to become teachers... Sprague believed that most students chose teaching because they had no other

options, and she set out to explore alternatives” (p. 66), but says little else about women and teaching. Radke-Moss’ (2008) history of women at four western land-grant institutions during the same period frames women’s coursework in domestic economy primarily in terms of preparation for the work of a housewife, acknowledging only in passing that many graduates also taught in this area. Radke-Moss emphasizes that the domestic science curriculum “reinforced a separate sphere for land-grant women” (p. 143) even as they negotiated inclusion and equality for themselves in other areas of land-grant college life; surely whether they were preparing for teaching as opposed to other careers played a role in this multifaceted process of negotiation. One of the colleges Gordon profiles is Vassar, a member of the prestigious “Seven Sisters.” Other work on these eastern colleges in the late nineteenth and early twentieth centuries (e.g., Horowitz, 1984; Johnson, 2007) also says little about teacher preparation. Johnson reports that southern women who attended the Seven Sisters went on to forge “new roles for women, especially in social reform and education” (p. 150); it would help to know whether becoming educators shaped their intentions to attend northern colleges or their experiences while there.

Olsen (2000) writes about the promotional literature of three of the Seven Sisters in the 1940s, arguing that “distancing themselves from feminism and other ‘dangerous’ ideas and traditions helped these women’s colleges adjust to the chilly climate” (p. 419). The literature, she argues, stressed students’ ambitions to become “wives and mothers *as well as* doctors, engineers, teachers, and civic leaders” (p. 421), but teaching’s acceptance as a very conventional role for women calls for further examination of its use and trajectory in this promotional literature. Eisenmann’s (2006) history of “the adaptive activism of postwar advocates for women, particularly regarding higher education” (p. 2) does not discuss teacher education, probably because it was not a concern of the education leaders, commissions, professional organizations, and institutional programs on which she focuses. The chapters in Miller-Bernal and Poulson’s edited histories (2004, 2006) of women attending formerly men’s colleges and women’s colleges’ responses to the upsurge in coeducation in the second half of the twentieth century also pay surprisingly little attention to teacher preparation; surely gender shifts in these schools’ student bodies had an impact on institutions’ views of and approaches to teacher education. Teacher education remains a significant element in women students’ choices; Glazer-Raymo (1999) notes that in even 1994, women earned 75.8% of bachelor’s degrees in education (p. 133).

The work of these and other scholars has led to much greater understanding of women’s access to and experiences in higher education, even if it tends to gloss over teacher education. This research has begun to infiltrate the broader historiography of higher education but still remains somewhat segregated, which Dzuback (2003) argues is limiting, as “*gender* is the central story of the history of higher education” (p. 174). Although writing earlier than Dzuback, Clifford (1983, 1995) goes one step further, arguing that not only did female students’ *absence* as well as *presence* shape higher education but that their presence was tied to the expansion of teacher preparation: “Women, especially as student consumers, belong at the core, not the periphery of the evolution of American higher education as we know it.

Furthermore ... the enabling role played by college and university women was initially driven, and sustained thereafter, by demand for more, and better educated, schoolteachers" (1995, p. 93). It didn't hurt that state legislatures were often willing to fund scholarships in order to increase the teacher supply; "Given the underenrolled condition of most colleges and universities before the 1890s, if not later, such teacher-scholars were welcomed, at least by the treasurer" (pp. 13–14). Clifford (1995) also explains that the "initial portal" for women's entry "was usually the 'back door': the summer session ... or the Teachers' Course—usually carefully described as representing a generous public service and not as an alteration of the schools' fundamental character as an institution for, and by, men" (p. 93). Clifford (1983, 1995) makes a huge historiographic contribution in demonstrating the impact of teacher education on the overall development of higher education.

In most cases aside from Columbia and Harvard – Cremin et al. (1954) and Powell (1980) describe how hostility toward women's presence placed firm boundaries around their limited access to only the education school at these institutions – the portal Clifford (1995) describes soon granted access to the entire institution; this was "the major route by which many colleges and universities became coeducational" (Clifford, 1983, p. 25). Manekin's (2010) account of slowly expanding access for women at the University of Pennsylvania demonstrates how those forces played out. Central in her story is how teacher preparation, initially offered through extension-type courses in the 1890s, brought the first women students to Penn. In 1913, the state legislature, desperate for trained teachers, offered the university a "generous" budget for teacher preparation, and it responded by creating a coeducational School of Education, which led to some access for women to the College of Liberal Arts as well. It was the university's desire to secure funding and improve its market position through teacher training that allowed women students to gain a toehold at Penn.

Clifford (1983, 1995; Clifford & Guthrie, 1988) also suggests that women's intentions to become teachers shaped their college experiences as well as the institutions themselves. Women students selected curricula that would enhance their prospects, which in turn shored up those areas of the university. Specifically, "women's enrollments functioned to 'hold the line' for the liberal arts," which "constituted the largest part of the secondary schoolteacher's preparation ... Professors might resent the presence of any, or so many, 'coeds,' but the fact remains that otherwise underemployed liberal arts faculty were finding their classes filled—with women" (1995, pp. 99–100). In her comparison of women students' experiences at the University of Wisconsin and the state's normal schools between 1870 and 1920, Ogren (1995) argues that, while women students at the university faced hostility and exclusion from many areas of the curriculum and campus life, the normals' official purpose of preparing students for teaching – an entirely acceptable occupation for women – created a space in which "the experiences of students inside and outside the classroom did not hinge on gender differences" (p. 3). Female and male students functioned as intellectual equals in the classroom and literary societies, enjoyed a friendly social life, and were all able to develop teamwork and leadership skills. This account raises questions about how teacher-education programs may have

functioned within multipurpose institutions during the same period. In the epilogue to her wider history of state normal schools, Ogren (2005) further suggests that the move away from teacher education as their official purpose profoundly changed the once normal schools' atmosphere, reducing the level of gender equality. Deeper research on women students' experiences under the umbrella of teacher education at various types of institutions throughout the twentieth century would enhance the historiography of women's education, as well as that of the broader development of higher education institutions.

Of course, many of the women preparing to be teachers were also from minority racial and ethnic groups and/or of low socioeconomic status. Scholarly attention to teacher education as a motivating factor in access for these groups, as for women, has been uneven. Most of the research on minority racial and ethnic groups has focused on African-Americans, including their own and others' philanthropic support of advanced education. Like Anderson's (1988) history of education for blacks in the South, Anderson and Moss' (1999) history of northern philanthropy for southern black education in the early twentieth century highlights southern blacks' "demand for black teachers" (p. 15). They discuss philanthropists' shift away from supporting Hampton-Tuskegee-style industrial teacher education and emphasize that the General Education Board increased its spending in the 1920s because of a teacher shortage: "Quite simply, teacher training, which had been a major focus of GEB planning from the beginning, propelled the spending bulge of the 1920s" (p. 100). Considering Anderson and Moss' relatively high level of attention to teacher education, it is somewhat surprising that the subject is absent from Gasman's (2007a) history of the United Negro College Fund, which was established in 1944. Drewry and Doermann's (2001) work on private black colleges suggests a possible explanation. They emphasize the centrality of teacher education in early freedmen's colleges and the connection between the expansion of teaching jobs for African-Americans and growth in black colleges in the early twentieth century but also point out that between 1966 and 1996, as other occupations became more accessible, "student interest at private black colleges grew rapidly in business and declined in school teaching" (p. 208); at these institutions, 37% of bachelor's degrees awarded in 1966 and only 9% awarded in 1996 were in education (p. 210).

Historians of education for African-American women tell a parallel story about the role of "race uplift" as a motivation for college attendance. Perkins (1988) writes that "'race uplift' ... was the foundation of education as viewed by blacks" (p. 66); "the earliest black female graduates understood also that their desire for an education was directly linked to aiding their race" (73). Although Perkins does not explicitly list teaching as a component of race uplift, Noble (1988) emphasizes it: "A distinguishing fact about black women's pursuit of higher education during the first half of this [twentieth] century was their ... commitment to achieve goals of 'race uplift'" (p. 87). "Black women seemed to be highly motivated to achieve college educations and become teachers" (p. 89). Breaux (2010) similarly argues that African-American women in Iowa between 1878 and 1928 attended college out of "a strong desire to 'uplift the race' through teaching" (p. 181) – even when most of the state's public schools would not hire them as teachers. Noble further explains that the philosophy

of race uplift largely disappeared when black college students became “job-oriented” (p. 105) at midcentury, which is also when the United Negro College Fund appeared. While historians have elucidated the central role of teacher preparation in motivating interest in and support for black higher education before the mid-twentieth century, they have written little about its role in the following period. Further exploration of the decline of teaching as motivation for these students would enhance understanding of their higher education in general and of the trajectory of philanthropy. Gasman (2007b) observes that historical work on black colleges excludes “substantive discussion of black women” (p. 761); perhaps more attention to this group and their involvement in teaching, or lack thereof, would enhance coverage of the history of teacher education at black colleges.

Histories of higher education for Catholic women are more consistent in focusing on teacher preparation as a motivation for the establishment and growth of institutions as well as student attendance. Mahoney (2002) writes that rising educational requirements for teacher certification at the turn of the twentieth century were a major factor in the Catholic Church’s decision to establish women’s colleges in the USA. Perrone (2006) explains that students at New Jersey’s Catholic women’s colleges pursued “vocational training, particularly in teaching” (p. 12), especially during the Depression; as late as 1965–1970, at the College of Saint Elizabeth, “elementary education was the largest major” and many students “majoring in the arts and sciences or home economics went into secondary school teaching” (p. 27). In his history of three Catholic women’s colleges established in the 1920s in Philadelphia, Contasta (2002) notes distinctions that correspond to students’ social-class backgrounds. Immaculata College served mainly lower-middle and middle-class students and had a practical curricular thrust; in 1953, it was the first of the three colleges to gain state approval for a degree in elementary education. Rosemont College, meanwhile, served mainly upper-middle and upper-class students and “refused for decades to offer a degree in education *per se*” (p. 141). Rury (1997) similarly suggests that teacher education primarily appealed to Catholic students from lower social classes in his discussion of DePaul University’s coeducational liberal-arts campus in downtown Chicago during the 1930s: “Most of the adult students who came to DePaul through the teacher education program were themselves teachers or others aspiring to the middle class status of teachers” (p. 21).

While historians of Catholic women’s higher education are particularly effective in weaving teacher education into their histories, Contasta (2002) and Rury (1997) also add the strand of social class. Not all historians recognize both dimensions, however. The few historians of higher education who focus on class issues and lower-class students tend to gloss over teacher education. Allmendinger (1975) makes many references to “schoolkeeping” in his groundbreaking history of poor college students in nineteenth-century New England, but his concern is how the students used teaching to finance their education. He explains that provincial colleges such as Williams and Middlebury extended their winter breaks so that students could teach in the common schools, but he does not discuss whether or how the colleges prepared students for this role or whether they continued to teach after graduation. Nidiffer and Bauman (2004) argue in their account of the

University of Michigan's treatment of poor students between 1870 and 1910 that, as the university became increasingly inaccessible to students of limited means, many of these students went instead to normal schools/teachers colleges. They do not discuss teacher education *per se*, but it would likely enhance their analysis because this was the period when research universities such as Michigan were beginning to shift their attention from teacher preparation to educational research. In his social-class analysis of American higher education in the interwar period, Levine (1986) argues that the normal schools became teachers colleges in large part to accommodate "practical-oriented, lower middle-class students" (p. 162) and thus preserve more prestigious institutions for wealthier students. He states that when the teachers colleges began to expand their functions, they "were criticized for putting their desire for expansion and their students' ambitions ahead of a statewide determination of the appropriate division of labor" (p. 167), suggesting that teacher education functioned as a curricular track to reproduce the social structure.

Nidiffer (1999) praises Allmendinger (1975) and Levine (1986) as two of the few historians to place poor students or class issues at the center of analysis, yet many historians of teacher education and/or normal schools bring social class into their accounts because it had such a big influence on the development and status of these programs and institutions. For example, Powell (1980) refers to social-class status concerns throughout his history of education at Harvard, such as when he mentions President Lowell's doubts that teaching "could attract Harvard graduates" (p. 138) and when he describes Dean Keppel's efforts to attract "graduates from the better liberal arts colleges" (p. 244). From a different angle, Clifford (1995) emphasizes that it was the need for teachers that diversified university student bodies in terms not only of gender but of class and race. In California and elsewhere beginning in the late nineteenth century, "The schools' need for teachers probably broadened the social composition of college and university student bodies ... more quickly and to an extent beyond anything previously experienced" (p. 102). Green (2007) demonstrates how this played out during the antebellum period in the South's all-male military schools, where tuition remission in exchange for a promise to teach following graduation allowed young men "to attempt to raise themselves in the status-conscious society" (p. 61).

Similar programs at state normal schools from the mid-nineteenth into the twentieth century resulted in such an influx of lower-class students that Herbst (1980, 1989a), Brown (1988), Altenbaugh and Underwood (1990), and Ogren (2003, 2005) argue that they were in effect the "people's colleges." Herbst (1989a) writes, "it was the normal schools rather than the land-grant colleges that really brought higher education to the people" (p. 142). Ogren (2003, 2005) further argues that the social-class, racial/ethnic, and gender composition of their student bodies meant that normal schools had a long tradition of serving students who would later be considered "nontraditional": "While their official mission was preparing teachers, the characteristics of their student bodies forced the normals to expand their unofficial mission to include welcoming unsophisticated students into an engaging intellectual and public life" (2003, p. 642).

Beyond illuminating what drew many lower-class and minority students to higher education and what drove some institutions to accommodate them, focusing on teacher education opens a window to their experiences as college students. In her history of campus life, Horowitz (1987) profiles three types of undergraduate students: “college men” and women were the popular, often wealthy leaders of fraternities and sororities; “rebels” actively opposed the college men and were often engaged in larger political and cultural life; and “outsiders” were serious students from modest backgrounds who aspired to upward social mobility. The first generation of college women and many generations of students of color on predominantly white campuses belonged to the third group. Horowitz writes that many outsiders planned to become teachers, but she says less about outsiders than other students, noting “It is difficult to learn about serious students from conventional sources” (p. 68) and “at most schools they composed the bulk of students, but they were often invisible to observers” (p. 174). Focusing on teacher education, however, makes outsiders more visible. Allison (1998), for example, provides a glimpse into the life of outsiders at the University of Tennessee in the 1890s: “Often poor, rural, and unschooled,” they “were sometimes objects of derision by other students. Personal newspaper columns by students reported with glee the practical jokes that upper-classmen played on ‘the innocent fish’ of the new Teachers’ Department.” Other student publications reported “a ‘metamorphosis’ among them as time passed,” and they began to wear “the more seemly derby, spotless linen and neat shoes” (p. 27), suggesting that they did not simply accept their outsider status; Allison’s account makes these students multidimensional.

Looking at students at state normal schools/teachers colleges and municipal teacher-training schools calls Horowitz’s categorization of students into question. Ogren (2005) argues that during the heyday of the state normal school, students whose characteristics would have qualified them as Horowitz’s outsiders at other types of institutions were at the center of normal-school campus life. They organized and attended socials and receptions, went on excursions together, were leaders and active participants in literary societies and other clubs, and the women played basketball with great enthusiasm. Similarly, Markowitz (1993) writes that at New York’s teacher-training colleges of the 1930s, young working-class Jewish women played an “activist role” (p. 41) that is not generally prominent in historical accounts of the student peace movement. Many joined the American Student Union and “other peace groups,” which, “with women in the forefront, proliferated on city campuses” (p. 45). Markowitz explains, “among city students who demonstrated and marched to protest the spread of Nazism was Bella Abzug, later to become a congresswoman from New York City, who attended Hunter College from 1939 to 1943” (p. 46). Active in literary-society debates, playing basketball, or marching for peace, these students hardly fit Horowitz’s profile of “outsiders.”

While focusing on students in teacher-education programs and institutions extends and complicates the notion of “outsiders,” it also raises issues regarding the academic careers of underrepresented students. Although not a history, Rochlin’s (1997) analysis of the experiences of African-American and Latino/a students at the University of Arizona includes many excerpts from interviews that are essentially oral histories.

One is with Cressworth Lander, a black student who attended in the 1940s and remembered, “I didn’t want to be a teacher. I’m a businessman. At the University of Arizona they said, ‘We don’t have people like you in business school. Are you sure you don’t want to be a teacher or a preacher?’” Lander’s account suggests that the university attempted to track students of color into education: “When Morgan Maxwell Jr. and I would sign up for a business class we would have to hear, ‘Gee, do you really want to take a business class? Don’t you want to be a teacher? Marketing and banking? Do you really need to be taking these classes?’” (p. 89). Rochlin’s inclusion of this reminiscence calls for further research on placement of minority and lower-class students, as well as women, in teacher-preparation programs throughout the twentieth century. Situating teacher education at the core of analysis will integrate underrepresented groups more fully into scholarship on the history of higher education, which in turn will open important new avenues of inquiry.

Sites

As historians in the last few decades have enriched scholarly understanding of the experiences of underrepresented students, they have also widened their focus on the sites of higher education. Again, though, this work pays uneven attention to the preparation of teachers. Incorporating teacher education into this aspect of inquiry will enhance scholarly understanding of the variety of higher education institutions in the nineteenth century and institutional hierarchy in the twentieth century. Early histories of higher education in the nineteenth century focused almost exclusively on the college, and the picture they painted was a bleak one of unpopular institutions with an antiquated curriculum. Beginning in the 1970s, newer generations of historians were highly critical of their predecessors’ interpretation. From Potts’ (1971, 1977) arguments that denominational colleges were in fact oriented toward local needs and offered practical studies to Nivison’s (2010) account of how antebellum New England colleges “routinely engaged in progressive curricular reform in response to the broader political and social pressures of the day” (p. 461), recent historians have done much to rescue the nineteenth-century college from historical ignominy. It is therefore surprising that they have overlooked the college’s role in preparing teachers almost completely. Even Geiger’s (2000) edited collection of new interpretations of the American college in the nineteenth century makes almost no mention of teacher preparation. The fact summed up in Fraser’s (2007) sub-heading, “Colleges and Universities Have Always Prepared Teachers” (p. 136), would only strengthen arguments that the colleges offered a useful curriculum and served popular needs. Although they did not generally offer teacher training as an official program of study – after all, pedagogical theory was in its infancy before the late nineteenth century – these institutions saw many of their graduates become teachers, an important social service. Their role in preparing teachers, even unofficially, cements the argument that these colleges filled local needs and their curriculum had practical uses.

Historians who do incorporate teacher education into their analysis of nineteenth-century educational institutions offer another important corrective to the traditional view: colleges were not the only institutions providing higher education. Clifford's (1995) focus on teacher preparation as well as gender leads her to conclude: "Throughout the nineteenth century, the line dividing secondary and tertiary education was extremely porous, with overlapping functions, pedagogy, curriculum, and clientele ... Many academies, seminaries, high schools, normal schools, and even certain grammar schools offered some 'collegiate' and professional work" (p. 4), especially in the area of teacher preparation. When women were not welcome in colleges or when colleges were inaccessible to young men and women of limited means, they instead attended normal schools (Herbst, 1989a; Ogren, 2005) or academies. Tolley (2003) and Nash (2005) illustrate how female academy students pursued advanced subjects, including science and sometimes Latin and Greek, and often went on to teach those subjects. Beadie (2002) explains that students attended academies in order to improve themselves intellectually and to form social networks and that "probably the largest group of students for whom academy study had instrumental value consisted of those who sought to improve their prospects as teachers" (p. 102). Her portrait of "the culture of educational aspiration that took hold in American society in the nineteenth century" (p. 108) further demonstrates that higher education answered local needs and had practical uses and thus that earlier historians' overly negative portrayals were inaccurate.

The forces that influenced transitions in teacher education in the decades surrounding the turn of the twentieth century also created a status hierarchy among institutions of higher education. As enrollments grew and research expanded, research universities and wealthy older institutions gained prestige, and other institutions formed a pecking order beneath them. Lazerson (1998) explains that "segmentation" thus became a distinguishing feature of the American system: "Higher education accepted the equation that access to college could be widespread if the system was segmented. A complex web of different kinds of postsecondary institutions was already formed by the late 1930s, from junior and community colleges through the small number of selective liberal arts colleges and research universities" (p. 70). Labaree (2006) similarly emphasizes that "stratification" created four tiers of institutions: the private and public colleges with colonial roots and, later, state flagship universities were at the top, followed by land-grant universities, then the regional institutions that originated as normal schools, and finally the junior/community colleges. Historians outline the complex – and often racist, classist, and sexist – process of admissions that evolved beginning in the 1920s to sort students into different tiers (e.g., Geiger, 1986/2004; Karabel, 2005; Levine, 1986; Wechsler, 1977), and Levine (1986) and Douglass (2000) examine how state management shaped the public institutions in California into discrete tiers to create one of the most distinctive state systems. In limiting the state colleges, most of which were former normal schools, to preparing students for teaching and other social-welfare positions, Levine states, California specified that they "should emphasize 'cooperative thinking,' not the creation of new knowledge. Nor should they cultivate leadership skills" (p. 173). This seems to suggest that pejorative views of teaching and the preparation of teachers

underlay the state's policy decisions, calling for deeper consideration of teacher education in relation to the formation of institutional stratification.

Most of the historical research on how types of institutions functioned within the hierarchy focuses on those at the bottom or the top and also tends to gloss over the role of teacher preparation. After Levine (1986) suggests that California funneled lower-class students into teachers/state colleges in order to reinforce the social structure, he continues: "Most important, however, was the rapid development of the public junior college" (p. 162). His and other research on the history of community colleges (e.g., Brint & Karabel, 1989; Labaree, 1997) does not discuss teacher preparation, probably because junior/community colleges did not have official programs. Still, plans to become teachers would have required community college students to study the liberal arts, meaning that if the institutions diverted them from this curriculum, they also diverted them from a teaching career. It therefore might be useful to investigate the extent to which these students hoped to become teachers.

At the other end of the hierarchy, Geiger's (1986/2004) history of research universities before World War II acknowledges that "actual and future teachers," including those who attended summer sessions, "accounted for much of the absolute growth of American higher education in the 1920s," but he turns away from this line of analysis with the observation that "their precise share cannot be accurately determined" (p. 110). When he discusses the importance of summer sessions in expanding the clientele of research universities, Geiger states that they "attracted serious, mature students" (p. 14) but does not elaborate on who these students were. Much of the literature on the history of teacher education (e.g., Allison, 1998; Elsbree, 1939/1970; Harper, 1935) points out, however, that summer schools, as well as early university extension work, were attended mainly by practicing teachers and became quite important to the institutions. Cremin et al. (1954) explain that by the late 1910s, Teachers College's summer sessions were so popular and successful that Columbia tried to exert more administrative control. At many elite institutions, income from summer instruction for teachers was seen as a "service" to the larger university (Clifford & Guthrie, 1988, p. 134). Further research on the history of teacher preparation at research universities could weigh this service against Geiger's (1986/2004) contention that before World War II, education was one of the subjects whose "pursuit ... at private research universities was numerically insignificant" (p. 114). In his history of research universities since World War II, Geiger mentions the field of education only a few times. He acknowledges that education was among the social and behavioral sciences that attracted support from philanthropic foundations between 1945 and 1960 and briefly discusses national concerns about K-12 education during the 1950s but focuses mainly on military, medical, and other scientific research, which, after all, garnered the most government and private support. Still, more attention to the role of education would enhance his analysis of the University of California at Los Angeles' rise to research prominence, considering that it began as "merely a normal school" (p. 135).

There is remarkably little historical scholarship on the institutions in the lower-middle range of the hierarchy during the twentieth century: regional state colleges and universities, most of which had begun as normal schools. Dunham (1969) titles

his profile of these institutions in the 1960s *Colleges of the Forgotten Americans* to acknowledge the lower socioeconomic status of their students and points out that they actually enrolled 21% of the students in higher education. “The majority of America’s new teachers,” Clifford and Guthrie (1988) add, “were educated in” these “ignored institutions” (p. 175). Levine (1986) and Douglass (2000) summarize the functions assigned to this institutional tier in California but do not focus on the colleges themselves. An edited volume by Clark, Leslie, and O’Brien (2010) on the first six decades of the State University of New York, or SUNY, system, created in 1948, is one of the few works to pay attention to these institutions. As the editors explain in their introduction, the “heart and face of the [new] system were eleven State Teachers Colleges” (p. xviii), as well as six agricultural and technical institutes. The book presents 27 papers – “Twenty-Seven Ways to Understand SUNY” (p. xxi) – which cover: policy and political history; analyses of demographics, diversity issues, and SUNY’s international role; reflections of former chancellors; and institutional profiles of research universities, technical schools, community colleges, and the former normal schools/teachers colleges in Oswego, Geneseo, and Brockport. In the volume, Nekritz (2010) presents an overview of how World War II and the G.I. Bill resulted in expansion in the 1950s and 1960s at Oswego, and Mahood (2010) focuses on institutional changes at Geneseo that resulted from enrollment declines and budget shortfalls in the 1970s, leading to a refocused curriculum, enhanced student recruitment, and jumps in rankings by the 1980s and 1990s. Offering a rare glimpse into regional state colleges, these portraits of Oswego and Geneseo still just scratch the surface – and they hardly discuss teacher education.

Considering teachers colleges’ place at the “heart” of the SUNY system, the volume on its first 60 years includes surprisingly little discussion of teacher preparation. Aside from brief mentions in other chapters, O’Brien and Leslie’s (2010) profile of Brockport is the only one that focuses on the subject. They compare Brockport’s teacher-education curriculum in the 1950s and early 1960s to James Koerner’s critique in his 1963 book, *The Miseducation of American Teachers*, finding that Brockport included much liberal-arts coursework. They observe that teachers colleges were “probably scapegoated unfairly after Sputnik” (p. 63) and offer evidence of “surprising continuities in the transition from the postwar state teachers colleges of the 1950s to the comprehensive college of the late 1960s and subsequent decades” (p. 62). O’Brien and Leslie conclude, “state teachers colleges played such a critical role in the maturation of SUNY’s university colleges that they deserve to be rescued from ‘history’s scrapheap’” (p. 63). However, their chapter is only a small step in that direction; regional state colleges and universities deserve more prominence in the overall historiography of higher education because they have played such a significant role in educating teachers and have served “forgotten Americans” throughout their history.

Greater attention to the history of teacher education will enhance the treatment of sites and students, as well as scholarship and structures, within the wider historiography of higher education. A broad, somewhat nebulous structure that ties students to sites is the market; histories that look at markets join these two strands.

For example, Manekin (2010) emphasizes the role of the market throughout her account of women's entry into the University of Pennsylvania. Concerned "with the local educational market and a desire to enhance Penn's position as a research-oriented institution" (p. 302), she argues, "administrators made decisions about what women could or should study within this larger concern for markets, prestige, and internal politics" (p. 300). Thus, women gained access to the College of Education because the local market needed teachers and Penn could preserve its prestige in other areas. Markets are also integral in Labaree's (2004) analysis of teacher education's lowly status. He argues that market pressures to provide teachers for empty classrooms, to provide people's colleges for students of limited means, and then to provide higher status university credentials all pulled teacher education in contradictory directions, effectively marginalizing and trivializing the undertaking. While Labaree's main focus is status hierarchies within research universities, Ogren's (2003, 2005) work on state normal schools speaks to hierarchies among different types of institutions. Her argument that normal schools had a long history of providing a rich educational experience for students now considered "nontraditional" suggests that the low status of teacher education may be due, at least in part, to its history of serving students of low social status. Works such as these are only a beginning; research on teacher education has great potential to advance historical scholarship on institutional hierarchies in higher education, the experiences of students from underrepresented groups, and to make connections between these two areas of inquiry.

Conclusion: Directions for Future Research

Although the historiography of higher education seems to confirm Fraser's (2007) observation that the history of teacher preparation is an overlooked topic, synthesis of the scattered work of generations of historians of teacher education reveals a rich historiography. Gaps remain in this body of scholarship, however; filling them and better integrating the history of teacher preparation into scholarship on the overall history of higher education will help to bring teacher education in from the historiographical periphery. Regarding the period of Beginnings in teacher education from the 1820s through the 1880s, historians have fleshed out the rise of state normal schools from the top-down and the bottom-up. While historians provide an overview of the content of early instruction in pedagogy and the first efforts to train teachers at colleges and universities, further research on student experiences in and the gender, class, and race dimensions of teacher education at these institutions would enhance the historiography of the beginnings of teacher education. Synthesis of histories of the period between the 1890s and the 1930s reveals three transitions in teacher education. Early historians view the transition of state normal schools into teachers colleges in positive light, and recent historians point out negative changes in students' experiences; further research could work to unravel this contradiction. Historians' delineations of the transition at elite research universities to a

focus on graduate education and research and the transition at other universities and colleges to a stronger commitment to teacher education both call for more examination and comparison of student experiences in teacher education at the different types of universities. Regarding the period of Upgrading Amid Disfavor from the 1940s through the turn of the twenty-first century, historians detail and critique the major developments, suggesting that what appeared to be institutional upgrades were actually downgrades for teacher education and that upgrading teaching candidates was elitist. Largely missing from this top-heavy account are students' experiences in "upgraded" institutions, M.A.T. programs, and the Teacher Corps. Historical work on teacher education in the second half of the twentieth century, like work on earlier periods, would benefit from more attention to students and their experiences.

Historians of higher education in the last few decades have paid a great deal of attention to students' experiences and to institutional variety and hierarchy in the nineteenth and twentieth centuries. Even though the historiography of teacher education pays less attention to students outside state normal schools, more focus on teacher education would enhance work in both of these areas. Historians of higher education have recently made great strides in researching the attendance and experiences of students who were female, from minority racial and ethnic groups, and/or of low socioeconomic status. Because many of these students sought to become teachers, more consistent attention to the importance of teacher preparation in motivating their attendance and shaping their college experiences, as well as the structure of the institutions, would be an important contribution to this scholarship. In addition, recognizing the teacher-preparation functions of nineteenth-century institutions would support arguments that the colleges served community needs and that academies and normal schools filled college-like roles; and focusing on teacher education in twentieth-century colleges and universities would help to define and differentiate tiers in the institutional hierarchy. Teacher education has been integral to higher education since the medieval universities began to grant the *licentia docendi*; historians face the continuing challenge to make it more integral in the historiography of higher education as a whole.

References

- Allison, C. B. (1998). *Teachers for the South: Pedagogy and educationists in the University of Tennessee, 1844–1995*. New York: Peter Lang.
- Allmendinger, D. F. (1975). *Paupers and scholars: The transformation of student life in nineteenth-century New England*. New York: St. Martin's Press.
- Altenbaugh, R. J., & Underwood, K. (1990). The evolution of normal schools. In J. I. Goodlad, R. Soder, & K. A. Sirotnik (Eds.), *Places where teachers are taught* (pp. 136–186). San Francisco: Jossey-Bass.
- Anderson, J. D. (1988). *The education of blacks in the South, 1860–1935*. Chapel Hill, NC: The University of North Carolina Press.
- Anderson, E., & Moss, A. A. (1999). *Dangerous donations: Northern philanthropy and southern black education, 1902–1930*. Columbia, SC: University of Missouri Press.

- Beadie, N. (2002). Internal improvement: The structure and culture of academy expansion in New York State in the antebellum era, 1820–1860. In N. Beadie & K. Tolley (Eds.), *Chartered schools: Two hundred years of independent academies in the United States 1727–1925* (pp. 89–115). New York: RoutledgeFalmer.
- Beatty, B. (1990). Teaching teachers in private universities. In J. I. Goodlad, R. Soder, & K. A. Sirotnik (Eds.), *Places where teachers are taught* (pp. 187–235). San Francisco: Jossey-Bass.
- Bigelow, K. W. (1957). The passing of the teachers college. *Teachers College Record*, 58(8), 409–417.
- Bledstein, B. J. (1976). *The culture of professionalism: The middle class and the development of higher education in America*. New York: W. W. Norton & Company, Inc.
- Bohi, M. J. (1968). *A history of Wisconsin State University Whitewater, 1868–1968*. Whitewater, WI: Whitewater State University Foundation.
- Borrowman, M. L. (1956). *The liberal and technical in teacher education: A historical survey of American thought*. New York: Teachers College Bureau of Publications.
- Borrowman, M. L. (Ed.). (1965). *Teacher education in America: A documentary history*. New York: Teachers College Press.
- Boyden, A. C. (1933). *The history of Bridgewater Normal School*. Bridgewater, MA: Bridgewater Normal Alumni Association.
- Boyles, D. R. (2003). Joseph Kinmont Hart and Vanderbilt University: Academic freedom and the rise and fall of a department of education, 1930–1934. *History of Education Quarterly*, 43(4), 571–609.
- Breaux, R. M. (2010). “To the uplift and protection of young womanhood”: African-American women at Iowa’s private colleges and the University of Iowa, 1878–1928. *History of Education Quarterly*, 50(2), 159–181.
- Brint, S., & Karabel, J. (1989). *The diverted dream: Community colleges and the promise of educational opportunity in America, 1900–1985*. New York: Oxford University Press.
- Brown, R. T. (1988). *The rise and fall of the people’s colleges: The Westfield State Normal School, 1839–1914*. Westfield, MA: Institute for Massachusetts Studies, Westfield State College.
- Burgess, C. (1990). Abiding by the “rule of the birds”: Teaching teachers in small liberal arts colleges. In J. I. Goodlad, R. Soder, & K. A. Sirotnik (Eds.), *Places where teachers are taught* (pp. 87–135). San Francisco: Jossey-Bass.
- Butchart, R. E. (2010). *Schooling the freed people: Teaching, learning, and the struggle for Black freedom, 1861–1876*. Chapel Hill, NC: The University of North Carolina Press.
- Cain, M. C. (1941). *The historical development of state normal schools for white teachers in Maryland*. New York: Teachers College Bureau of Publications.
- Cates, E. H. (1968). *A centennial history of St. Cloud State College*. Minneapolis, MN: Dillon Press.
- Clark, J. B., Leslie, W. B., & O’Brien, K. P. (Eds.). (2010). *SUNY at sixty: The promise of the State University of New York*. Albany, NY: State University of New York Press.
- Clifford, G. J. (1983, Fall). “Shaking dangerous questions from the crease”: Gender and American higher education. *Feminist Issues*, 3, 3–62.
- Clifford, G. J. (1995). *“Equally in view”: The University of California, its women, and the schools*. Berkeley, CA: Center for Studies in Higher Education and Institute of Governmental Studies, University of California, Berkeley.
- Clifford, G. J., & Guthrie, J. R. (1988). *Ed school: A brief for professional education*. Chicago: The University of Chicago Press.
- Collins, C. (2011). *“Ethnically qualified”: Race, merit, and the selection of urban teachers, 1920–1980*. New York: Teachers College Press.
- Contasta, D. R. (2002). The Philadelphia story: Life at Immaculata, Rosemont, and Chestnut Hill. In T. Schier & C. Russett (Eds.), *Catholic women’s colleges in America* (pp. 123–160). Baltimore: The Johns Hopkins University Press.
- Cordier, M. H. (1992). *Schoolwomen of the prairies and plains: Personal narratives from Iowa, Kansas, and Nebraska, 1860s–1920s*. Albuquerque, New Mexico: The University of New Mexico Press.

- Cremin, L. A., Shannon, D. A., & Townsend, M. E. (1954). *A history of Teachers College, Columbia University*. New York: Teachers College Press.
- Cruikshank, K. (1990). Centralization, competition, and racism: Teacher education in Georgia. In J. I. Goodlad, R. Soder, & K. A. Sirotnik (Eds.), *Places where teachers are taught* (pp. 330–381). San Francisco: Jossey-Bass.
- Dedman, W. W. (1969). *Cherishing this heritage: The centennial history of the State University College at Brockport, New York*. New York: Appleton.
- Douglass, J. A. (2000). *The California idea and American higher education: 1850 to the 1960 Master Plan*. Stanford, CA: Stanford University Press.
- Drewry, H. N., & Doermann, H. (2001). *Stand and prosper: Private Black colleges and their students*. Princeton, NJ: Princeton University Press.
- Dunham, E. A. (1969). *Colleges of the forgotten Americans: A profile of state colleges and regional universities*. New York: McGraw-Hill.
- Dzuback, M. A. (2003). Gender and the politics of knowledge. *History of Education Quarterly*, 43(2), 171–195.
- Edmonds, A. O., Bruce, E., & Geelhoed, E. B. (2001). *Ball State University: An interpretive history*. Bloomington, IN: Indiana University Press.
- Eisenmann, L. (1990). The influence of bureaucracy and markets: Teacher education in Pennsylvania. In J. I. Goodlad, R. Soder, & K. A. Sirotnik (Eds.), *Places where teachers are taught* (pp. 287–329). San Francisco: Jossey-Bass.
- Eisenmann, L. (2006). *Higher education for women in postwar America, 1945–1965*. Baltimore: The Johns Hopkins University Press.
- Elsbree, W. S. (1939/1970). *The American teacher: Evolution of a profession in a democracy*. Westport, CT: Greenwood Press.
- Fowler, H. E. (1949). *A century of teacher education in Connecticut: The story of the New Britain State Normal School and the Teachers College of Connecticut, 1849–1949*. New Britain, CT: The Teachers College of Connecticut at New Britain.
- Fraser, J. W. (2007). *Preparing America's teachers: A history*. New York: Teachers College Press.
- Gasman, M. (2007a). *Envisioning black colleges: A history of the United Negro College Fund*. Baltimore: The Johns Hopkins University Press.
- Gasman, M. (2007b). Swept under the rug? A historiography of gender and black colleges. *American Educational Research Journal*, 44(4), 760–805.
- Geiger, R. L. (1986/2004). *To advance knowledge: The growth of American research universities, 1900–1940*. New Brunswick, NJ: Transaction Publishers.
- Geiger, R. L. (1993/2004). *Research and relevant knowledge: American research universities since World War II*. New Brunswick, NJ: Transaction Publishers.
- Geiger, R. L. (Ed.). (2000). *The American college in the nineteenth century*. Nashville, TN: Vanderbilt University Press.
- Ginsburg, M. B. (1987, Spring). Teacher education and class and gender relations: A critical analysis of historical studies of teacher education. *Educational Foundations*, 2, 4–36.
- Gitlin, A. (1996). Gender and professionalization: An institutional analysis of teacher education and unionism at the turn of the twentieth century. *Teachers College Record*, 97(4), 588–624.
- Glazer-Raymo, J. (1999). *Shattering the myths: Women in academe*. Baltimore: The Johns Hopkins University Press.
- Goodchild, L., & Huk, I. P. (1990). The American college history: A survey of its historiographic schools and analytic approaches from the mid-nineteenth century to the present. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 4, pp. 201–290). New York: Agathon Press.
- Goodlad, J. I. (1990). Connecting the present to the past. In J. I. Goodlad, R. Soder, & K. A. Sirotnik (Eds.), *Places where teachers are taught* (pp. 3–39). San Francisco: Jossey-Bass.
- Gordon, L. D. (1990). *Gender and higher education in the progressive era*. New Haven, CT: Yale University Press.

- Gordy, J. P. (1891). *Rise and growth of the normal-school idea in the United States*. Washington, DC: GPO.
- Graver, L. (1955). *A history of the first Pennsylvania State Normal School, now the State Teachers College at Millersville*. Millersville, PA: State Teachers College.
- Green, J. R. (2007). Networks of military educators: Middle-class stability and professionalization in the late antebellum South. *The Journal of Southern History*, 73(1), 39–74.
- Haberman, M., & Stinnett, T. M. (1973). *Teacher education and the new profession of teaching*. Berkeley, CA: McCutchan Publishing Corporation.
- Harper, C. A. (1935). *Development of the teachers college in the United States, with special reference to the Illinois State Normal University*. Bloomington, IL: McKnight & McKnight.
- Harper, C. A. (1939). *A century of public teacher education: The story of the state teachers colleges as they evolved from the normal schools*. Washington, DC: American Association of Teachers Colleges.
- Haskins, C. H. (1923/1957). *The rise of universities*. Ithaca, NY: Cornell University Press.
- Hendrick, I. G. (1990). Teacher education and leadership in major universities. In J. I. Goodlad, R. Soder, & K. A. Sirotnik (Eds.), *Places where teachers are taught* (pp. 236–284). San Francisco: Jossey-Bass.
- Herbst, J. (1980). Nineteenth-century normal schools in the United States: A fresh look. *History of Education*, 9(3), 219–227.
- Herbst, J. (1989a). *And sadly teach: Teacher education and professionalization in American culture*. Madison, WI: The University of Wisconsin Press.
- Herbst, J. (1989b). Teacher preparation in the nineteenth century: Institutions and purposes. In D. Warren (Ed.), *American teachers: Histories of a profession at work* (pp. 213–236). New York: Macmillan Publishing Company.
- Hoffman, N. (1991). Places where status is sought. *History of Higher Education Annual*, 11, 81–93.
- Hoffman, N. (2003). *Woman's "true" profession: Voices from the history of teaching* (2nd ed.). Cambridge, MA: Harvard Education Press.
- Hofstadter, R., & Metzger, W. P. (1955). *The development of academic freedom in the United States*. New York: Columbia University Press.
- Horowitz, H. L. (1984). *Alma mater: Design and experience in the women's colleges from their nineteenth-century beginnings to the 1930s*. New York: Knopf.
- Horowitz, H. L. (1987). *Campus life: Undergraduate culture from the end of the eighteenth century to the present*. Chicago: The University of Chicago Press.
- Hunt, C. W. (1956). Toward a profession of teaching. In D. P. Cottrell (Ed.), *Teacher education for a free people* (pp. 18–55). Oneonta, NY: The American Association of Colleges for Teacher Education.
- Isbell, E. R. (1971). *A history of Eastern Michigan University, 1849–1965*. Ypsilanti, MI: Eastern Michigan University Press.
- Johnson, W. R. (1987). Empowering practitioners: Holmes, Carnegie, and the lessons of history. *History of Education Quarterly*, 27(2), 221–240.
- Johnson, W. R. (1989). Teachers and teacher training in the twentieth century. In D. Warren (Ed.), *American teachers: Histories of a profession at work* (pp. 237–256). New York: Macmillan Publishing Company.
- Johnson, J. M. (2007). Job market or marriage market? Life choices for southern women educated at northern colleges, 1875–1915. *History of Education Quarterly*, 47(2), 149–172.
- Johnson, H. C., & Johanningmeier, E. V. (1972). *Teachers for the prairie: The University of Illinois and the schools, 1868–1945*. Urbana, IL: University of Illinois Press.
- Karabel, J. (2005). *The chosen: The hidden history of admission and exclusion at Harvard, Yale, and Princeton*. Boston: Houghton Mifflin.
- Kaufman, P. W. (1984). *Women teachers on the frontier*. New Haven, CT: Yale University Press.
- Labaree, D. F. (1997). *How to succeed in school without really learning: The credentials race in American education*. New Haven, CT: Yale University Press.
- Labaree, D. F. (2004). *The trouble with Ed schools*. New Haven, CT: Yale University Press.

- Labaree, D. F. (2006). Mutual subversion: A short history of the liberal and the professional in American higher education. *History of Education Quarterly*, 46(1), 1–15.
- Lagemann, E. C. (2000). *The elusive science: The troubling history of education research*. Chicago: University of Chicago Press.
- Lazerson, M. (1998, September). The disappointments of success: Higher education after World War II. *Annals of the American Academy of Political and Social Sciences*, 559, 64–76.
- Levin, R. A. (1990). Recurring themes and variations. In J. I. Goodlad, R. Soder, & K. A. Sirotnik (Eds.), *Places where teachers are taught* (pp. 40–83). San Francisco: Jossey-Bass.
- Levin, R. A. (1994). *Educating elementary school teachers: The struggle for coherent visions, 1909–1978*. Lanham, MD: University Press of America.
- Levine, D. O. (1986). *The American college and the culture of aspiration, 1915–1940*. Ithaca, NY: Cornell University Press.
- Lucas, C. J. (1997). *Teacher education in America: Reform agendas for the twenty-first century*. New York: Palgrave Macmillan.
- Mahoney, K. A. (2002). American Catholic colleges for women: Historical origins. In T. Schier & C. Russett (Eds.), *Catholic women's colleges in America* (pp. 25–54). Baltimore: The Johns Hopkins University Press.
- Mahood, W. (2010). “A touch of New England in Western New York”: The transformation of SUNY Geneseo. In J. B. Clark, W. B. Leslie, & K. P. O'Brien (Eds.), *SUNY at sixty: The promise of the State University of New York* (pp. 63–77). Albany, NY: State University of New York Press.
- Manekin, S. (2010). Gender, markets, and the expansion of women's education at the University of Pennsylvania, 1913–1940. *History of Education Quarterly*, 50(3), 298–323.
- Markowitz, R. J. (1993). *My daughter, the teacher: Jewish teachers in New York city schools*. New Brunswick, NJ: Rutgers University Press.
- Marshall, H. E. (1956). *Grandest of enterprises: Illinois State Normal University, 1857–1957*. Normal, IL: Illinois State Normal University.
- Mattingly, P. H. (1975). *The classless profession: American schoolmen in the nineteenth century*. New York: New York University Press.
- Miller-Bernal, L., & Poulson, S. L. (Eds.). (2004). *Going coed: Women's experiences in formerly men's colleges and universities, 1950–2000*. Nashville, TN: Vanderbilt University Press.
- Miller-Bernal, L., & Poulson, S. L. (Eds.). (2006). *Challenged by coeducation: Women's colleges since the 1960s*. Nashville, TN: Vanderbilt University Press.
- Nash, M. A. (2005). *Women's education in the United States, 1780–1840*. New York: Palgrave Macmillan.
- Nekritz, T. (2010). SUNY Oswego: From recovery and refugees to re-invention and revival. In J. B. Clark, W. B. Leslie, & K. P. O'Brien (Eds.), *SUNY at sixty: The promise of the State University of New York* (pp. 41–54). Albany, NY: State University of New York Press.
- Nidiffer, J. (1999). Poor historiography: The “poorest” in American higher education. *History of Education Quarterly*, 39(3), 321–336.
- Nidiffer, J., & Bauman, J. P. (2004). “The university of the poor”: The University of Michigan's transition from admitting impoverished students to studying poverty, 1870–1910. *American Educational Research Journal*, 41(1), 35–67.
- Nivison, K. (2010). “But a step from college to the judicial bench”: College and curriculum in New England's “age of improvement”. *History of Education Quarterly*, 50(4), 460–487.
- Noble, J. (1988). The higher education of black women in the twentieth century. In J. M. Faragher & F. Howe (Eds.), *Women and higher education in American history* (pp. 87–106). New York: W. W. Norton & Company.
- Nye, J. G. (2001). *Southwestern Oklahoma State University: The first 100 years*. Weatherford, OK: Southwestern Oklahoma State University.
- O'Brien, K. P., & Leslie, W. B. (2010). Rescuing the state teachers college from history's scrapheap. In J. B. Clark, W. B. Leslie, & K. P. O'Brien (Eds.), *SUNY at sixty: The promise of the State University of New York* (pp. 54–63). Albany, NY: State University of New York Press.
- Ogren, C. A. (1995). Where coeds were coeducated: Normal schools in Wisconsin, 1870–1920. *History of Education Quarterly*, 35(1), 1–26.

- Ogren, C. A. (2000). "A large measure of self-control and personal power": Women students at state normal schools during the late-nineteenth and early-twentieth centuries. *Women's Studies Quarterly*, 27(3 & 4), 211–232.
- Ogren, C. A. (2003). Rethinking the "nontraditional" student from a historical perspective: State normal schools in the late nineteenth and early twentieth centuries. *Journal of Higher Education*, 74(6), 640–664.
- Ogren, C. A. (2005). *The American state normal school: "An instrument of great good"*. New York: Palgrave Macmillan.
- Ogren, C. A. (2008). Sites, students, scholarship, and structures: The historiography of American higher education in the post-revisionist era. In W. J. Reese & J. L. Rury (Eds.), *Rethinking the history of American education* (pp. 187–222). New York: Palgrave Macmillan.
- Olsen, D. M. (2000). Remaking the image: Promotional literature of Mount Holyoke, Smith, and Wellesley Colleges in the mid-to-late 1940s. *History of Education Quarterly*, 40(4), 418–459.
- Pangburn, J. M. (1932). *The evolution of the American teachers college*. New York: Teachers College Bureau of Publications.
- Park, B. L. (1960). *Cortland – our alma mater: A history of Cortland Normal School and the State University of New York Teachers College at Cortland, 1869–1959*. New York: Cortland.
- Perkins, L. M. (1988). The education of black women in the nineteenth century. In J. M. Faragher & F. Howe (Eds.), *Women and higher education in American history* (pp. 64–86). New York: W. W. Norton & Company.
- Perkins, L. M. (1989). The history of blacks in teaching: Growth and decline within the profession. In D. Warren (Ed.), *American teachers: Histories of a profession at work* (pp. 344–369). New York: Macmillan Publishing Company.
- Perrone, F. H. (2006). "A well-balanced education": Catholic women's colleges in New Jersey, 1900–1970. *American Catholic Studies*, 117(2), 1–31.
- Potts, D. B. (1971, Winter). American colleges in the nineteenth century: From localism to denominationalism. *History of Education Quarterly*, 11, 363–380.
- Potts, D. B. (1977, February). "College enthusiasm!" as public response, 1800–1860. *Harvard Educational Review*, 47, 28–42.
- Powell, A. G. (1980). *The uncertain profession: Harvard and the search for educational authority*. Cambridge, MA: Harvard University Press.
- Radke-Moss, A. G. (2008). *Bright epoch: Women & coeducation in the American West*. Lincoln, NE: University of Nebraska Press.
- Reed, D. H. (1948). *The history of teachers colleges in New Mexico*. Nashville, TN: George Peabody College for Teachers.
- Reuter, F. T. (1963). *West Liberty State College: The first 125 years*. West Liberty, WV: West Liberty State College.
- Rochlin, J. M. (1997). *Race & class on campus: Conversations with Richardo's daughter*. Tucson, AZ: The University of Arizona Press.
- Rogers, B. (2009). "Better people, better teaching": The vision of the National Teacher Corps, 1965–1968. *History of Education Quarterly*, 49(3), 347–372.
- Rogers, D. (1961). *Oswego: Fountainhead of teacher education: A century in the Sheldon tradition*. New York: Appleton.
- Rousmaniere, K. (1997). *City teachers: Teaching and school reform in historical perspective*. New York: Teachers College Press.
- Rudolph, F. (1962/1990). *The American college and university: A history*. Athens, GA: University of Georgia Press.
- Rudolph, F. (1977). *Curriculum: A history of the American course of study since 1636*. San Francisco: Jossey-Bass.
- Rury, J. (1989). Who became teachers? The social characteristics of teachers in American history. In D. Warren (Ed.), *American teachers: Histories of a profession at work* (pp. 9–48). New York: Macmillan Publishing Company.
- Rury, J. (1997). The urban Catholic university in the early twentieth century: A social profile of DePaul, 1898–1940. *History of Higher Education Annual*, 17, 5–32.

- Ryle, W. H. (1972). *Centennial history of the Northeast Missouri State Teachers College*. Kirksville, MO: Northeast Missouri State Teachers College.
- Skopp, D. R. (1989). *Bright with promise: From the Normal and Training School to SUNY Plattsburgh, 1889–1989*. Norfolk, VA: The Donning Company.
- Solomon, B. M. (1985). *In the company of educated women: A history of women and higher education in America*. New Haven, CT: Yale University Press.
- Thelin, J. R. (2004). *A history of American higher education*. Baltimore: The Johns Hopkins University Press.
- Tolley, K. (2003). *The science education of American girls: A historical perspective*. New York: RoutledgeFalmer.
- Veysey, L. R. (1965). *The emergence of the American university*. Chicago: The University of Chicago Press.
- Warren, D. (1985). Learning from experience: History and teacher education. *Educational Researcher*, 14(10), 5–12.
- Warren, D. (1989). Introduction: Teachers, reformers, and historians. In D. Warren (Ed.), *American teachers: Histories of a profession at work* (pp. 1–5). New York: Macmillan Publishing Company.
- Wechsler, H. (1977). *The qualified student: A history of selective college admissions in America*. New York: Wiley-Interscience.
- Weiler, K. (1998). *Country schoolwomen: Teaching in rural California, 1850–1950*. Stanford, CA: Stanford University Press.
- Wiebe, R. H. (1967). *The search for order, 1877–1920*. New York: Hill and Wang.
- Williamson, O. J. (1936). *Provisions for general theory courses in the professional education of teachers*. New York: Teachers College Bureau of Publications.
- Wofford, K. V. (1935). *An history of the status and training of rural elementary teachers of the United States, 1860–1930*. Pittsburgh, PA: Thomas Siviter & Company.
- Woodring, P. (1975). The development of teacher education. In K. Ryan (Ed.), *Teacher education: The seventy-fourth yearbook of the National Society for the Study of Education* (pp. 1–12). Chicago: University of Chicago Press.
- Wright, D. S. (1926). *Fifty years at the Teachers College: Historical and personal reminiscences*. Cedar Falls, IA: Iowa State Teachers College.

Chapter 10

A Review and Critique of the Literature on Community College Students' Transition Processes and Outcomes in Four-Year Institutions

Peter Riley Bahr, Christie Toth, Kathryn Thirolf, and Johanna C. Massé

Introduction

The successful transfer of students from community colleges to four-year institutions is a topic of considerable interest to researchers, policymakers, administrators, and practitioners, perhaps more now than at any time in the history of the community college. Among the reasons for this mounting attention is a growing concern about the educational and economic competitiveness of the United States (National Center for Public Policy and Higher Education, 2008). Community colleges, which provide postsecondary education to nearly half of undergraduates (American Association of Community Colleges, 2012), are perceived correctly as a key partner in rectifying America's lagging postsecondary attainment (e.g., National Center for Public Policy and Higher Education, 2011).

In addition, there is persistent and increasing unease about inequitable opportunities across lines of race/ethnicity and social class, particularly regarding the completion of the baccalaureate degree, which serves as a principal portal to upward

P.R. Bahr, Ph.D. (✉)

Center for the Study of Higher and Postsecondary Education,
University of Michigan, Room 2108, 610 E. University Avenue, Ann Arbor,
MI 48109-1259, USA
e-mail: prbahr@umich.edu

C. Toth

Joint Program in English and Education, University of Michigan,
Ann Arbor, MI 48109-1259, USA

K. Thirolf

Center for the Study of Higher and Postsecondary Education, University of Michigan,
Ann Arbor, MI 48109-1259, USA

J.C. Massé

Center for the Study of Higher and Postsecondary Education and the Department of Sociology,
University of Michigan, Ann Arbor, MI 48109-1259, USA

socioeconomic mobility (e.g., Cabrera, Burkum, & La Nasa, 2005; Dowd & Melguizo, 2008). Given that community colleges are a primary point of postsecondary entry for underrepresented and disadvantaged students (Hagedorn, 2010), student transfer from community colleges to four-year institutions warrants scholarly consideration (Aragon & Perez, 2006; Jain, Herrera, Bernal, & Solorzano, 2011; Lee, 2001; Mullin, 2012; Shaw & London, 2001; Townsend, 1995).

Finally, attention to the efficient use of resources by public postsecondary institutions has escalated in recent decades (Alexander, 2000; Layzell, 1999), and one result of this attention is the widespread emergence of systems of performance accountability for community colleges (Dougherty, Hare, & Natow, 2009; Dougherty & Hong, 2006; Harbour, 2003), which typically focus on aggregate student outcomes (Bahr, 2013a; Bailey, Calcagno, Jenkins, Leinbach, & Kienzl, 2006; Goldberger, 2007; Zarkesh & Beas, 2004). Prominent among these outcomes is the rate of upward transfer from the community college to four-year institutions (Armstrong, 1993; Bahr, Hom, & Perry, 2005; Grubb, 1991; Hom, 2009; McMillan & Parke, 1994; Sylvia, Song, & Waters, 2010; Townsend, 2002; Wassmer, Moore, & Shulock, 2004), resulting in heightened scrutiny of the overall success of community college transfer students, both in transferring to four-year institutions and in completing baccalaureate degrees (Ehrenberg & Smith, 2004; Fabes & Mattoon, 2007; Townsend & Wilson, 2006a).

Cast broadly, the area of inquiry concerned with student transfer from community colleges to four-year institutions incorporates a range of topics, including the measurement, validity, and stability of community college students' self-reported academic goals (e.g., Adelman, 2005; Hom, 2009); cooling-out versus warming-up of community college students' academic ambitions (e.g., Alexander, Bozick, & Entwisle, 2008; Bahr, 2008a); institutional support for transfer in the community college through advisors, faculty, transfer centers, and other institutional assets and human resources (e.g., Eagan & Jaeger, 2009; Shaw & London, 2001); student-level variables that influence the likelihood of transfer (e.g., Dougherty & Kienzl, 2006; Doyle, 2009, 2011; Lee & Frank, 1990; Hagedorn, Moon, Cypers, Maxwell, & Lester, 2006; Roksa & Calcagno, 2010; Surette, 2001); articulation agreements and transfer partnerships between community colleges and four-year institutions (e.g., Falconetti, 2009; Hagedorn, 2010; Ignash & Kotun, 2005; Kisker, 2007; Roksa & Keith, 2008; Turner, 1992); the recruitment, admission, support, and graduation of community college transfer students by four-year institutions (e.g., Dowd, Cheslock, & Melguizo, 2008; Zamani, 2001); student-level variables that influence community college students' academic performance in, and likelihood of graduation from, the four-year institution (e.g., Carlan & Byxbe, 2000; Melguizo & Dowd, 2009; Roksa, 2006; Kozeracki, 2001; Wang, 2009); community college students' experiences of transition into and through the four-year institution (e.g., Bahr et al., 2012; Eggleston & Laanan, 2001; Laanan, 2007; Townsend, 2008); and a variety of other topics. However, the common denominator in all of this work is a concern with community college students' completion of baccalaureate degrees. In other words, the bottom line is not transfer, support for transfer, institutional partnerships around transfer, etc., but the completion of the degree itself. All of the work in this area

ultimately connects, either directly or indirectly, to the analysis and improvement of processes and outcomes with respect to the attainment of the baccalaureate.

The vast majority of the literature in this area of inquiry, which spans decades, has focused on the community college, rather than the four-year institution. On one hand, this focus is warranted because much of a community college student's eventual academic fate will be determined in his or her first postsecondary institution. Case in point, the majority of community college students require remedial assistance in basic skills, such as math, writing, or reading (Bailey, Jeong, & Cho, 2010), and students' successful navigation of remedial coursework is a primary determinant of their eventual academic outcomes, including transfer to a four-year institution (Bahr, 2008b, 2010a, 2010b, 2013b).

On the other hand, insofar as the *success* of community college transfer students is concerned, the narrow focus on the community college neglects half of the equation, namely, the four-year institution (Piland, 1995). In fact, the literature is oddly myopic in this regard. As Aragon and Perez (2006) argue,

[t]he first impulse of researchers is to examine how the community college fosters the transfer process; consequently, they overlook a vital facet of the transfer process — that is, the pivotal role four-year institutions play in the recruitment, transition, retention, and eventual graduation of these students. (p. 83)

To illustrate, the implementation of all of the best practices in community colleges for supporting student transfer will realize few gains if, for example, nearby four-year institutions are impacted and restricting admission of transfer students, as is being experienced to some extent in California now (Varlotta, 2010) and has been experienced by other states in the past (Townsend & Wilson, 2006a). Likewise, policies or practices in the four-year institution that make it difficult for community college students to transfer course credit, secure financial aid, enroll in coursework, locate or receive necessary assistance, or otherwise navigate the institution will hinder the success of these students, working at cross-purposes with the transfer mission of community colleges (Dougherty, 1987). Unless these students' academic endeavors can be supported and sustained in the four-year institution, the success of community colleges in transferring students to the four-year institution will have little impact on baccalaureate attainment. To quote an old adage, "it takes two to tango." Both the community college and the four-year institution share responsibility for the outcomes of community college transfer students.

One result of this narrow perspective on transfer has been a relative dearth of research on the transition processes of community college transfer students in four-year institutions, which we refer to throughout this chapter as *post-transfer transition processes*. With the exception of a few sustained lines of research (e.g., Cejda and colleagues, Laanan and colleagues, Townsend and colleagues), most of the work in this area has been sporadic and unsystematic. In fact, in reviewing the literature on community college students' post-transfer transition processes, one is struck by how little ground has been gained in the last several decades. The subject simply has not garnered the widespread and persistent interest from the academic community that would support substantial advances in knowledge. This is unfortunate and troubling because this particular area of inquiry is critical to informing the

policies and practices of four-year institutions with respect to facilitating the success of community college transfer students.

This problem of a lack of sustained and systematic inquiry is compounded by the fact that the existing body of research on post-transfer transition processes, taken as a whole, exhibits a number of weaknesses that hinder the advancement of knowledge in this area. First, with occasional exceptions (e.g., Berger & Malaney, 2003; Owens, 2010; Townsend & Wilson, 2006b), very few studies are built on a comprehensive review of the literature, resulting in vague exploratory research questions, redundancy across studies in the research questions posed, and few definitive tests of explicit hypotheses. In other words, the literature often is not self-reflective. Second, across this area of inquiry, terminology is used haphazardly, and concepts that appear repeatedly across studies either are left undefined or are defined inconsistently, which makes the accumulation of knowledge difficult even for the few studies that *do* draw on a comprehensive review of the literature. Third and closely related, work in this area exhibits an overreliance on single indicators of complex, multidimensional concepts. Moreover, when multiple indicators *are* used in a given study, they seldom are adopted for use by other researchers in other studies, making it difficult to compare and contrast findings across studies. Finally, work on post-transfer transition processes is marked by an overreliance on single-institution studies, though this would be a less serious issue if the majority of the work were built on the literature and drew on shared definitions of concepts and shared measures of those concepts.

Here, we endeavor to begin resolving the first three of these problems, which may be described as the fragmented condition of the literature on post-transfer transition processes. To this end, we have four goals for this chapter:

1. Identify and articulate the set of concepts that appear most frequently in the literature on students' post-transfer transition processes.
2. Define these concepts and situate them within wider bodies of literature on higher education.
3. Discuss and critique the operational definitions of these concepts and summarize the findings regarding each as they pertain to community college students' post-transfer transition processes.
4. Provide recommendations for the development and advancement of future inquiry in this area.

The reader should note that our goal here is neither to provide definitive answers to the pressing questions regarding community college students' post-transfer transition processes nor to add a new set of concepts to a body of literature that already is murky and disconnected. Rather, we seek to provide a framework of concepts that already are employed in the literature (either explicitly or implicitly) and to summarize the findings concerning these concepts in order to illuminate common threads of ideas and establish a foundation on which researchers may build future work as they seek to frame and answer the pressing questions.

To accomplish the goals that we have outlined for this chapter, we conducted an extensive search of the recent literature on community college students' post-transfer

experiences and outcomes. We focused particularly on articles in peer-reviewed journals and chapters in academic volumes, though from time to time in this chapter, we draw on reports, briefs, and dissertations as we deemed them useful for illuminating various concepts or findings. We also focused primarily on higher education in the US context, though we retained a small selection of works on higher education in Canada that we found especially informative. Finally, we narrowed the results to those studies that speak specifically to community college transfer students, as opposed to “transfer students” generally. We made the latter decision because we expected that the magnitude and quality of change experienced by students transferring from a community college to a four-year institution typically is greater than that experienced by students transferring from one four-year institution to another.

We begin our review at the end of the story, so to speak, examining evidence regarding baccalaureate degree completion by community college transfer students, which, as we noted earlier, is the central concern of research in this area and the interest that drives research on post-transfer transition processes in particular. We work backward from this endpoint to discuss findings concerning community college transfer students’ academic performance in four-year institutions, which is important because satisfactory academic performance is a necessary cause of degree completion. We then discuss the problem of concept conflation in the literature on post-transfer transition processes, which complicates considerably the interpretation of the findings in this body of work. Finally, we discuss the five core concepts that we place under the umbrella of post-transfer transition processes, including student *integration* into the four-year institution, student *involvement* in the four-year institution, *environmental pull* factors working against student integration and involvement, the *capital* that students possess at entry to the four-year institution, and the *transfer receptivity* of the four-year institution. We conclude by providing recommendations for future research on community college students’ post-transfer transition processes.

Note that we do not propose here a causal order of these five core concepts, as one might anticipate that we would do. In fact, as we see it, many of these concepts interact in their influence both on other concepts and on students’ academic performance and baccalaureate attainment. We leave it to future research to determine and demonstrate empirically the relative arrangement of these concepts.

Baccalaureate Degree Completion

As noted earlier, the completion of baccalaureate degrees is the central concern of research on student transfer from community colleges to four-year institutions and, in particular, of research on community college students’ post-transfer transition processes. In that regard, the literature on baccalaureate attainment by community college transfer students has focused largely on answering two questions (Laanan, 2001). The first question addresses whether attending a community college as the

first postsecondary institution helps or hinders baccalaureate-seeking students' chances of persisting in the four-year institution and completing the degree, as compared with attending a four-year institution as the first postsecondary institution (e.g., Alba & Lavin, 1981; Alfonso, 2006; Best & Gehring, 1993; Cabrera et al., 2005; Dougherty, 1987; Falconetti, 2009; Glass & Harrington, 2002; Lee, Mackie-Lewis, & Marks, 1993; Long & Kurlaender, 2009; Melguizo, 2009; Melguizo & Dowd, 2009; Melguizo, Kienzl, & Alfonso, 2011; Reynolds & DesJardins, 2009; Sandy, Gonzalez, & Hilmer, 2006). The second question is concerned with identifying the factors that influence community college transfer students' chances of completing a baccalaureate degree, over and above any influence of attending a community college (e.g., Arbona & Nora, 2007; Bailey & Weininger, 2002; Cejda, Rewey, & Kaylor, 1998; Freeman, Conley, & Brooks, 2006; Glass & Bunn, 1998; Koker & Hendel, 2003; Pennington, 2006; Roksa, 2006; Roksa & Keith, 2008; Townsend & Barnes, 2001; Wang, 2009).

The first question has been challenging to answer because, in order for the evidence to be convincing, one must account for student self-selection into a community college versus a four-year institution as the first institution attended (Townsend, 2007). This self-selection process is conditional on a variety of student characteristics (e.g., financial resources, academic preparedness) that, in turn, influence the likelihood of completing a baccalaureate degree. Consequently, research on this question may be characterized in some respects as a debate between scholars about the best analytical methods to employ in disentangling the true effect of attending a community college on students' eventual attainment (Bahr, 2013c).

Given this context, it perhaps is not surprising that the evidence regarding the effect of community college attendance on baccalaureate attainment is mixed. Some studies indicate that attending a community college as the first postsecondary institution reduces students' chances of eventually completing a baccalaureate degree (e.g., Alfonso, 2006; Baker & Vélez, 1996; Cabrera et al., 2005; Dougherty, 1987; Long & Kurlaender, 2009; Reynolds & DesJardins, 2009; Sandy et al., 2006), while other studies indicate little or no negative consequence associated with attending a community college (e.g., Alba & Lavin, 1981; Lee et al., 1993; Melguizo, 2009; Melguizo & Dowd, 2009; Melguizo et al., 2011).¹ Of note, all of the studies cited here that found little or no negative consequence associated with attending a community college focused on community college students who, in fact, did transfer to a four-year institution, comparing them with peers who were at a similar point in their academic careers but who had begun college at the four-year institution. These may be contrasted with studies that considered the whole of students' academic careers, comparing first-time students in community colleges with first-time students in four-year institutions, the majority of which demonstrate a net penalty to students' attainment from attending a community college. This pattern of findings underscores the need for continued research on the transfer transition itself, though it remains to be determined whether the purported "diversionary effect" of community colleges on students' chances of completing a baccalaureate degree (found in studies that consider the whole of students' undergraduate careers) is a result of (1) still-unaccounted-for differences between students who elect a community college

versus a four-year institution as the first postsecondary institution, (2) students' experiences in the community college, and/or (3) barriers to student transfer at the four-year institution.

By and large, research on the second question—what factors influence community college transfer students' chances of completing a baccalaureate degree?—has drawn less interest from the scholarly community and has been less systematic. Nevertheless, several student characteristics have been found repeatedly to be associated positively with baccalaureate attainment among community college transfer students, including socioeconomic status (e.g., Melguizo & Dowd, 2009), grade point average in the community college (e.g., Bailey & Weininger, 2002; Wang, 2009), and being female (e.g., Roksa, 2006). In one particularly enlightening study, Roksa and Keith (2008) found that state articulation policies between community colleges and public four-year institutions do *not* influence the chances that community college transfer students will complete a baccalaureate degree. Interestingly, however, comparatively few published studies have sought to quantify the influence of policies and practices in the four-year institution on community college transfer students' subsequent degree attainment, which constitutes an important oversight in the literature (for exceptions, see Ehrenberg & Smith, 2004; Glass & Bunn, 1998).

Academic Performance

It perhaps goes without saying that students' academic performance in the four-year institution is an important predictor of baccalaureate attainment (Cabrera et al., 2005; Nora, Barlow, & Crisp, 2005). The literature on community college transfer students has not neglected this observation and, in fact, is dominated by a focus on one concept in particular, namely, *transfer shock* (e.g., Bahr et al., 2012; Carlan & Byxbe, 2000; Cejda, 1997; Cejda & Kaylor, 1997; Cejda, Kaylor, & Rewey, 1998; Diaz, 1992; Glass & Harrington, 2002; Ishitani, 2008; Laanan, 2001; Pennington, 2006; Phlegar, Andrew, & McLaughlin, 1981; Rhine, Milligan, & Nelson, 2000; Thurmond, 2007; Townsend, McNerny, & Arnold, 1993). Transfer shock describes the relative decline in grade point average that community college students predictably experience upon entering the four-year institution.

In some respects, transfer shock appears to have received more attention in the literature than is warranted. The evidence indicates that the dip in grades experienced by community college transfer students is modest and often brief (e.g., Diaz, 1992), typically being observed only in the first semester or two in the four-year institution (e.g., Carlan & Byxbe, 2000; Glass & Harrington, 2002; Thurmond, 2007). Moreover, the evidence suggests that transfer shock is not universal. Instead, it appears to be confined primarily to certain disciplines, such as mathematics, business, and the physical and life sciences (e.g., Cejda, 1997; Cejda et al., 1998; Thurmond, 2007) or possibly even a result of difficulty with just a few courses (Quanty, Dixon, & Ridley, 1999), and moderated by the academic standing of the transfer student, such as transferring with at least junior status (as opposed to sophomore or freshman status) and

transferring with an associate's degree (e.g., Best & Gehring, 1993; Thurmond, 2007). Limited evidence suggests that it may be specific to certain types of receiving four-year institutions (Cejda & Kaylor, 1997). Still, some researchers have provided evidence of a negative association between the experience of transfer shock and the likelihood of continuing in the four-year institution and completing a baccalaureate degree (e.g., Dougherty, 1987; Ishitani, 2008; Pennington, 2006). Hence, identifying and implementing policies and practices in the four-year institution that will facilitate community college transfer students' successful transition remains an important goal (Rhine et al., 2000).

Conflated Concepts

It is difficult to discuss the core concepts in the literature on community college students' post-transfer transition processes without first addressing the widespread conflation of three closely related concepts that appear frequently in this literature: *integration*, *involvement*, and, to a lesser extent, *engagement*. Integration and involvement, in particular, have been taken up extensively in research on community college students' post-transfer transition processes, and, operationally, they often have been used interchangeably. This conflation has created a great deal of confusion in the literature and makes it difficult to synthesize findings regarding each of these concepts. In order to understand what each of these concepts contributes to our understanding of community college students' post-transfer transition processes, we first must disentangle the terms integration, involvement, and engagement by examining their distinctive origins and definitions.

The concept of *integration* can be traced to Tinto's (1975, 1987, 1993) seminal work on students' departure from college prior to completing a degree (i.e., "dropping out"). Building on Spady (1970) and drawing on Durkheim's (1961) theory of suicide, Tinto (1975) sought to explain and predict students' decisions to drop out of college by describing their integration (or lack thereof) into the postsecondary environment. His model proposed two types of integration: academic and social. Although the specifics of Tinto's model have evolved over the years (e.g., Tinto, 1987, 1993, 1997), the concept of integration has remained a consistent and integral component of his student departure framework. In a recent interview, Tinto explained that integration is a "state or perception of fit" (Wolf-Wendel, Ward, & Kinzie, 2009, p. 419)—a sense of identification with an institution and an adoption of the norms and values of the campus.

Astin's (1999) term *involvement* covers some of the same theoretical terrain as integration, but there are important distinctions between the two concepts. Involvement refers to the quantity and quality of the physical and psychological energy (typically measured in terms of time and effort) that a student invests in the college experience (Astin, 1999). Thus, the fundamental difference between integration and involvement is one of subjective *perception* versus objective *behavior*. While integration focuses on a student's sense of fit within an institution, involvement

focuses on a student's behaviors, such as participating in student clubs or other organizations, interacting with faculty, and the like.

Despite clear differences in the measures implied by the definitions of these concepts, involvement and integration often have been treated as one and the same, not only in the literature on community college transfer students but in the broader higher education literature as well (Wolf-Wendel et al., 2009). Still, the conflation of these two concepts is understandable in some respects because the behaviors that encompass involvement could be conceived (and seemingly often have been conceived) as indirect indicators that a student is experiencing the sense of fit that characterizes integration.

Like involvement, the concept of *engagement* centers on students' behaviors, but it focuses on those behaviors that have demonstrated associations with positive learning and personal development outcomes (Kuh, 2001a, 2009). Although the National Survey of Student Engagement (NSSE) has been used to collect data on college student engagement since 2000 (Kuh, 2001a), only a few researchers have used NSSE data to study the post-transfer transition processes of community college students (e.g., Ishitani & McKittrick, 2010; McCormick, Sarraf, BrckaLorenz, & Haywood, 2009). The literature on the role of engagement in these students' experiences is therefore quite limited. Consequently, we do not include a separate section on engagement in this chapter but instead discuss it alongside involvement.

As a whole, the literature on the transition processes of community college students who transfer to four-year institutions does not define and measure integration or involvement very clearly or consistently. For example, Ishitani and McKittrick (2010) described the goal of their study as "understanding the degree to which community college students *integrate* into a four-year institution" (p. 577; italics added). Yet, they focused their inquiry primarily on the concept of student engagement, analyzing data from NSSE. Similarly, Arbona and Nora (2007) defined academic integration as "the degree of students' academic involvement on campus, both in and out of the classroom" (p. 251), thereby equating integration with involvement. This kind of confusion in terms is very common in the literature on community college students' post-transfer transition processes. Hence, a primary goal of this chapter is to ameliorate the resulting conceptual distortion by aligning the measures that researchers have used with the appropriate concepts regardless of the terminology employed, thereby providing a clearer picture of what the findings of these studies can tell us about how each concept applies to the post-transfer transition processes of community college students. To that end, we begin with an exploration of the concept of integration

Integration

As we have noted, the literature on post-transfer transition processes of community college students generally has not defined the concept of integration clearly or consistently, and this confusion often carries over into the measures of integration

that have been employed. Here, we draw on the latest scholarly discussions on this topic (e.g., Wolf-Wendel et al., 2009) to situate integration primarily as a matter of student perception, as opposed to involvement, which is primarily a matter of student behavior. For the purposes of this review, we have chosen to synthesize the findings of studies that focus on students' perceptions of their own fit or belonging within the four-year institution as evidence of integration, regardless of the conceptual framing and terminologies used by the authors of those studies. In turn, we include the findings of studies that examine student behaviors in the four-year institution in the subsequent section on involvement, even when the authors of those studies used integration to frame their work. This section presents parallel discussions of the subconcepts of academic integration and social integration, outlining the definitions and measures of integration that researchers have used and summarizing the findings concerning community college transfer students' integration into the four-year institution.

Defining Academic Integration

The definition of academic integration has evolved over the years. Tinto (1975) initially defined academic integration as "the meeting of certain explicit academic standards" (primarily through grade performance) and identifying with the norms of the academic system (p. 104). He revised his model in later work (Tinto, 1987, 1993) and described academic integration as a student becoming incorporated into the academic and intellectual communities of his or her college and establishing competent membership in those communities. More recently, Tinto clarified that the concept of academic integration refers to perceptions of fit with the academic environment of a college resulting from interactions with faculty, staff, and peers in formal and informal academic settings (Wolf-Wendel et al., 2009).

A number of studies have explicitly addressed the academic integration of students who transfer from a community college to a four-year institution, and other studies have measured aspects of students' transfer experiences that inform the literature on academic integration. Unfortunately, only rarely have the researchers who conducted these studies clearly defined their use of the concept. Those who have provided a clear definition have referenced Tinto's work, defining integration as a sense of belonging to the institution (e.g., Townsend & Wilson, 2006b, 2009). Others have sought to build on Tinto's framework. Flaga (2006), for example, combined Tinto's model of integration with Beach's (1999) concept of consequential transitions. In Flaga's model, "integrating" (academically, socially, and physically) is the last of five stages of transition that transfer students experience, culminating in "a developmental change" that often includes a shift in perception or identity (p. 8). Too often, however, academic integration has not been well defined in the literature on community college transfer students' post-transfer transitions, which has contributed to confusion over how it should be measured.

Measuring Academic Integration

Given the ambiguities in the definition of the phrase *academic integration* in the literature on community college transfer students, it perhaps is not surprising that the concept has been measured inconsistently. Tinto himself has measured academic integration in a variety of ways and has acknowledged that the concept sometimes has been “mismeasured” in the literature (Tinto, 1997, p. 616). For example, in Tinto’s (1975) earliest work on integration, he posited that one measure of a student’s academic integration is academic performance (e.g., grade point average). Although scholarship on community college students’ post-transfer transition processes has used grades and other measures of academic performance, such as continuous enrollment in college, as a proxy for academic integration (e.g., Arbona & Nora, 2007; Pascarella, Smart, & Ethington, 1986; Townsend & Wilson, 2009), other scholars have argued that academic performance is distinct from academic integration (Cabrera, Castañeda, Nora, & Hengstler, 1992; Hurtado & Carter, 1997; Kraemer, 1997). Grade point average, in particular, is perceived to be problematic because it does not capture the “academic connection” of a student to a college, which is central to the concept of academic integration (Wolf-Wendel et al., 2009, p. 415). We concur with this assessment and therefore have excluded the literature that employs academic performance as a proxy for academic integration from this section.

Tinto (1975) also initially placed perceptions of interactions with faculty under the purview of social integration, rather than academic integration, but he conceded that perceptions of informal interactions with faculty members likely are related to both academic integration and social integration. In his later work, Tinto (1993) reconsidered this conceptualization and included faculty/staff interactions as part of the informal institutional experiences within the academic system of his model, rather than the social system, thereby reclassifying students’ perceptions of interactions with faculty as a measure of academic integration. The ongoing confusion around this aspect of Tinto’s model (e.g., McCormick et al., 2009) is perhaps symptomatic of the extent to which academic and social integration are interrelated and, to some degree, not easily distinguishable for community college transfer students, which is an issue that we discuss later in this chapter.

Academic integration encompasses students’ perceptions of academic fit and feelings of academic connectedness to their institution (Tinto, 1993; Wolf-Wendel et al., 2009). In the post-transfer transition literature, such perceptions fall into three broad categories: perceptions of actors (including faculty, staff, and peers), perceptions of environment, and perceptions of self.

Perceptions of Actors

Many studies have examined community college transfer students’ perceptions of the faculty, staff, and fellow students at their colleges. By far, the most common

measure of academic integration in the post-transfer transition literature is students' perceptions of faculty at their receiving four-year institution. For example, a number of studies have surveyed or interviewed students about the extent to which they perceive their faculty to be accessible, approachable, and willing to help students (e.g., Bahr et al., 2012; Davies & Casey, 1999; Davies & Dickmann, 1998; Harrison, 1999; Laanan, 2007; Townsend, 1995; Vaala, 1991; Volkwein, King, & Terenzini, 1986).

Several studies have examined students' impressions of academic staff (e.g., Bahr et al., 2012; Bers, Filkins, & McLaughlin, 2001; Davies & Dickmann, 1998; Harrison, 1999). Harbin (1997) did not explicitly define or discuss academic integration, but he surveyed community college transfer students about their perceptions of academic staff, particularly whether the students liked and trusted their academic advisor.

To a lesser extent, studies of post-transfer transition processes have used students' perceptions of their peers to measure academic integration. For example, Townsend (1995) explored students' perceptions of whether fellow students were willing to help one another academically. These types of perceptions speak to academic integration because, in principle, positive perceptions of faculty members, advisors, and peers at the receiving four-year institution reflect academic connectedness, fit, and a sense of belonging, which are the hallmarks of academic integration (Tinto, 1993).

Perceptions of Academic Environment

A number of studies have examined community college students' perceptions of the campus academic environment or culture at their receiving four-year institution (e.g., Berger & Malaney, 2003; Lee, 2001; Reyes, 2011; Townsend & Wilson, 2009). Terms used to describe this line of inquiry include "classroom environment" (Harrison, 1999), "academic environment" (Flaga, 2006; Glass & Bunn, 1998; Townsend, 1995), "academic community" (Townsend & Wilson, 2009), and "academic life" (Berger & Malaney, 2003; Davies & Casey, 1999; Davies & Dickmann, 1998). Through surveys (Davies & Dickmann, 1998; Glass & Bunn, 1998), interviews (Flaga, 2006; Townsend, 1995; Townsend & Wilson, 2009), and focus groups (Davies & Casey, 1999), researchers have asked community college students a range of questions about their perceptions of the academic environments at their receiving four-year institutions, including academic standards (Davies & Dickmann, 1998; Townsend, 1995), assignments and tests (Davies & Casey, 1999; Davies & Dickmann, 1998; Townsend, 1995), and classroom atmosphere and interactions (Flaga, 2006; Townsend, 1995). Of note, some studies include perceptions of faculty as part of an overarching category of academic environment (e.g., Flaga, 2006; Townsend, 1995). Other measures of academic integration that focus on the environment have addressed students' perceptions of the teaching styles and practices at the university, the orientation programs that they attended, and/or the academic advising or academic support services that they have received (e.g., Davies & Casey, 1999; Harrison, 1999; Townsend, 1995).

Although Laanan (1996) framed his theorization of community college transfer students' academic and social *adjustment* in terms of their involvement, rather than integration, some of the measures that he employed clearly addressed students' perceptions of the academic environment. According to Laanan (2004), community college transfer students must engage in "significant social and psychological relearning in the face of a new encounters, new teachers, new opportunities, and new academic, personal, and social demands" (p. 332). The greater the differences between the environments of the community college and the receiving institution—in terms of size, institutional culture, and academic and social expectations—the more dramatic the adjustment faced by the transfer student (Laanan, 2004). Laanan's Transfer Students' Questionnaire (L-TSQ) asked students to respond to statements such as "the large classes intimidate me" and "most students are treated like 'numbers in a book'" (Laanan, 1996, p. 78), both of which speak directly to the issue of academic integration. Because Laanan's measures of academic adjustment include both behaviors and perceptions of academic environment, we include his perception-related findings in this section and report his findings on academic behaviors in the section on involvement.

In principle, students are more likely to feel academically integrated or experience a sense of academic fit in their college if they perceive that the academic environment is positive (Tinto, 1993). However, the bulk of the literature has tended to focus more on the ways in which students' perceptions of the academic environment of their community college differ from that of the receiving four-year institution (e.g., Davies & Casey, 1999; Davies & Dickmann, 1998; Glass & Bunn, 1998; Townsend, 1995). While measuring the differences that students perceive between the academic environments of community colleges and four-year institutions is worthwhile, that approach alone does not fully address the extent to which transfer students integrate academically into the four-year institution.

Perceptions of Academic Self

Finally, studies on community college transfer students' academic integration at four-year institutions occasionally address relevant aspects of students' self-perceptions. For example, Glass and Bunn (1998) sought to measure the extent to which community college transfer students "felt out of place academically" in the four-year institution (p. 258). A few other studies that did not discuss academic integration explicitly nevertheless considered students' academic self-perceptions, including satisfaction with one's academic progress (Berger & Malaney, 2003); perceptions of whether one's writing, math, and speaking skills are "good enough" to do well academically (Harbin, 1997, p. 40); and perceptions that one's study habits are adequate to meet expectations in the four-year institution (Kintzer, 1973). On the other hand, Townsend and Wilson (2009) asked their participants directly about the extent to which they felt academically connected and integrated into their receiving institutions' academic community.

Although comparatively few studies have used students' perceptions of their academic selves to measure academic integration, we believe these measures align

most closely with the concept of academic integration as defined by Tinto (1993) (see also Wolf-Wendel et al., 2009). This is because perceptions of fit fundamentally are perceptions of self that reference (compare and contrast with) key features of the environment. Students' perceptions of the actors and environment of the receiving four-year institution also are important aspects of academic integration, but direct measures of fit between self and environment ultimately are the central indicators of that sense of belonging in the intellectual life of the institution that characterizes academic integration.

Findings on Academic Integration

Interestingly, despite the scholarly attention to the academic integration of community college transfer students in receiving four-year institutions, the influence of academic integration on community college transfer students' outcomes remains an open question. This is a result, in part, of the fact that academic integration often has been treated as synonymous with academic performance. For example, Pascarella et al. (1986) found that academic integration, along with social integration (discussed in the next section), had the most consistently positive effect on the persistence of community college transfer students of all the sets of variables in their model, including student background characteristics. However, their operationalization of academic integration included average undergraduate grades, which we (and others) have argued should be treated as distinct from academic integration.

Volkwein et al. (1986) found that students' *perceptions* of the quality and strength of their relationships with faculty (specifically their perceptions that faculty are concerned with teaching and student development) were significantly associated with self-reported intellectual growth, but they found that the *frequency* of student-faculty interactions (a measure of involvement, not integration) was not significantly associated with intellectual growth. Although this finding suggests that academic integration may have a greater impact on student outcomes than does academic involvement, their study did not address whether self-reported intellectual growth led to an increased likelihood of degree completion.

Of the factors that Townsend and Wilson (2009) found to facilitate community college transfer students' persistence, positive perceptions of (1) working with professors on research projects and (2) participating in clubs in their major were the only two factors that we would locate in the concept of academic integration, and the latter arguably is as much a measure of social integration as it is academic integration. However, smaller class sizes and being able to transfer a large number of credits were found to be much more important for students' persistence than was academic integration.

One question that has been raised is whether academic integration contributes to persistence or whether persistence contributes to academic integration. Townsend and Wilson (2009) suggest that academic integration occurred for the participants in their study *because* they persisted at the university for several semesters after transfer,

rather than the reverse. In fact, they found that students were able to persist despite the alienation and isolation that they felt initially in response to the large size of the university and their classes. Indeed, despite the long-standing scholarly interest in the role of academic integration in community college transfer students' attainment, more research is needed on the extent to which academic integration is related to transfer students' educational outcomes in four-year institutions.

This issue aside, research has demonstrated a high level of variation in community college students' academic integration along all of the dimensions that we have discussed, including perceptions of faculty, staff, peers, environment, and self. Case in point, just as faculty are a varied group of individuals, students' perceptions of faculty also are varied. Some studies report that community college transfer students perceive professors to be not readily available, and, further, that students experience their contact with faculty to be impersonal (e.g., Vaala, 1991), while others report that students perceive their university instructors to be mostly approachable and accessible (e.g., Davies & Dickmann, 1998). Findings are mixed even within individual studies. For example, while most of the students in Townsend's study (1995) perceived university faculty to be available for questions and meetings, others viewed them as distant and dismissive. Owens (2010) arrived at similarly varied results.

Despite the relatively large body of research on academic integration as measured by perceptions of actors at receiving four-year institutions, many questions remain unanswered. In particular, few studies have examined how students' perceptions of full-time faculty differ from their perceptions of part-time faculty, but those studies that have measured perceptions of part-time faculty or instructors suggest that students often are unsatisfied with graduate teaching assistants (e.g., Bers et al., 2001; Davies & Dickmann, 1998). In addition, although there are exceptions (e.g., Arbona & Nora, 2007; Ishitani & McKittrick, 2010; Lee, 2001), few studies of community college transfer students have examined how issues of race and ethnicity affect students' perceptions of faculty.

Studies of community college transfer students' perceptions of academic staff also yield mixed results. Some community college transfer students find the academic advising at their four-year institution to be helpful, while others describe negative experiences, including advisors who did not listen, were not accessible, or made inappropriate comments (Bers et al., 2001; Davies & Dickmann, 1998). The latter findings are particularly worrisome given studies showing that transfer students believe it is important to talk with advisors at four-year institutions, especially to confirm transfer of credits (Bers et al., 2001).

Because community college transfer students' perceptions and interactions with peers tend to fall under the purview of social integration, fewer measures of academic integration have focused on students' interactions with and perceptions of their peers. However, research indicates that transfer students perceive their peers to be among their most useful sources of information about what courses to take, often surpassing the academic advising staff (Bers et al., 2001). Furthermore, the importance of informal interactions with peers to many transfer students' academic integration suggests that the distinctions between social and academic integration

are less clear-cut for community college students than researchers have acknowledged previously (Townsend & Wilson, 2009), an issue we discuss at length later.

Findings on perceptions of the academic environment also are mixed and mirror the findings on perceptions of faculty, staff, and peers. Townsend (1995) and Davies and Dickmann (1998) found that some community college transfer students perceived their university environment and classroom atmosphere to be very competitive, but Cameron's (2005) study of nursing program transfer students did not affirm this finding. One consistent finding is that transfer students across many studies cited challenges associated with larger classes and the size and organizational complexity of the receiving four-year institution (e.g., Davies & Dickmann, 1998; Flaga, 2006; Lee, 2001; Owens, 2010; Kintzer, 1973; Townsend & Wilson, 2009). Owens reported that nearly all of her respondents voiced concerns about feeling "overwhelmed" by the size of the university (p. 103). Research suggests that community college transfer students tend to prefer smaller academic communities, including smaller departments and classes (e.g., Davies & Dickmann, 1998; Owens, 2010; Reyes, 2011; Townsend & Wilson, 2009).

Given these findings, it perhaps is not surprising that studies examining community college transfer students' academic self-perceptions also present a complicated picture. Some have found that a majority of students had neutral or positive perceptions of themselves academically, such as feeling "satisfied or very satisfied with their academic progress" (Berger & Malaney, 2003), and *not* feeling out of place academically (Glass & Bunn, 1998). Other studies, however, have found that transfer students perceived their study habits (e.g., taking notes and writing term papers) to be inadequate and felt concerned about "fitting in" at their university (e.g., Kintzer, 1973). In sum, it seems that community college transfer students' experiences of academic integration are varied and may be largely contingent on student characteristics, type of receiving institution, the academic culture of the receiving institution, and program of study, amid other factors. More research is needed to map these relationships clearly.

Defining Social Integration

Just as Tinto's concept of academic integration has figured prominently in discussions of community college students' post-transfer academic transitions, his companion concept of *social integration* has loomed large in research on the social dimensions of post-transfer transitions (e.g., Davies & Dickmann, 1998; Dougherty, 1987; Duggan & Pickering, 2008; Flaga, 2006; Glass & Bunn, 1998; McCormick et al., 2009; Townsend & Wilson, 2006b, 2009). As with academic integration, Tinto posited social integration as an important factor in students' decision to persist or depart from a particular institution. In his initial articulation of the concept, Tinto (1975) described social integration as a perception of fit or sense of belonging resulting from "informal peer group associations, semi-formal extracurricular activities, and interaction with faculty and administrative personnel within the college," all of which facilitate

“varying degrees of social communication, friendship support, faculty support, and collective affiliation” at the institution (p. 107). This connectedness influences students’ evolving assessment of the benefits and costs of remaining in college. According to Tinto (1993), students’ degree of social integration depends not on a broad or absolute compatibility with an institution’s dominant culture but rather on their ability to forge connections and build relationships within at least one institutional subculture. Furthermore, social integration influences students’ persistence not only by enhancing their sense of emotional well-being but also by supporting their academic integration into the institution (Nora & Cabrera, 1996).

While few have questioned the importance of community college transfer students’ academic integration in the receiving four-year institution, some have expressed doubts about the relevance of Tinto’s concept of social integration for community college transfer students (e.g., Townsend & Wilson, 2009). While Tinto (1975) briefly mentioned two-year colleges in his discussion of the effects of institution type on persistence, his original model of social integration focused primarily on the experiences of traditional-aged, full-time students attending residential, four-year institutions, ignoring the different circumstances faced by older students, returning students, and nonresidential students on commuter campuses (Bean & Metzner, 1985). Likewise, Tinto’s original model of social integration did not account sufficiently for the particular social and cultural challenges faced by students of color and other underrepresented groups in higher education (Rendón, Jalomo, & Nora, 2000; Tierney, 1992). In subsequent revisions of the model, Tinto (1993) attempted to address the experiences of nontraditional students by drawing more explicit attention to the influence of external commitments and educational intentions on social integration. Nonetheless, because both Tinto’s original (1975) and revised (1993) models focus on the experiences of lower-division students, particularly during their first year in postsecondary education, the applicability of the concept of social integration with respect to the post-transfer transition processes of community college transfer students—who usually have completed their first year of college elsewhere and often have junior standing—remains to be determined (Townsend & Wilson, 2009).

Despite the inexact fit between the parameters of Tinto’s models and the circumstances faced by community college transfer students, the concept of social integration often has been adopted uncritically by researchers studying post-transfer transition processes (e.g., Dougherty, 1987; Duggan & Pickering, 2008; McCormick et al., 2009; Townsend & Wilson, 2006b). Some have invoked Tinto’s work as a rationale for examining the social dimensions of transfer students’ experiences at the four-year institution (e.g., Berger & Malaney, 2003; Owens, 2010). Others have marshaled the concept of social integration unquestioningly to support their interpretations of findings (e.g., Duggan & Pickering, 2008; McDonough, 2000). Indeed, the assumption that social integration plays a role in transfer student persistence is so ubiquitous in the literature that its influences are visible even in studies in which Tinto is never explicitly cited (e.g., Bers et al., 2001; Davies & Casey, 1999; Dworkin, 1996; Gawley & McGowan, 2006).

Other researchers investigating the transfer transition process have dealt more critically with the concept of social integration. Some have sought to augment or elaborate on Tinto's concept to better account for the unique experiences of community college transfer students. Such efforts have included attempts to theorize the importance of finding a social "niche" at the receiving institution (Harrison, 1999) and to bring insights from complexity and network theories to bear on the concept of social integration (Kelly, 2009). Others have framed their studies explicitly as tests of the applicability of Tinto's model of social integration for community college transfer students (e.g., Cameron, 2005; Flaga, 2006; Townsend & Wilson, 2009). As described in the section on academic integration, Flaga built on Tinto's integration framework to offer a model of transfer student transition processes that highlights the temporal nature of integrating socially, as well as academically and physically. Her model identifies multiple social steps to the transition process, including connecting socially, gaining familiarity with the social scene, and negotiating the social norms and behaviors of the receiving institution, all of which lead to integration. Townsend and Wilson, on the other hand, came to a rather different conclusion, asserting that, "Tinto's construct of social integration... may have little relevance for [community college transfer] students as they accustom themselves to an educational community very different from the community college" (p. 420). In sum, the concept of social integration is simultaneously pervasive and contested in the literature on the post-transfer transition processes of community college students.

Although "social integration" has been the term most frequently invoked by researchers investigating the social dimensions of community college students' post-transfer transition processes, several other terms have been used to discuss related processes. Many researchers have drawn, either implicitly or explicitly, on Astin's concept of involvement (discussed in the next section) to examine students' social behaviors at the receiving institution (e.g., Berger & Malaney, 2003; Flaga, 2006; Laanan, 1996, 2007). Likewise, Laanan's (1996) conceptualization of adjustment, like the conceptualization of integration, has both academic and social dimensions (Eggleston & Laanan, 2001; Laanan, 1996) but is psychosocial in nature (Laanan, 1996, 2004). Although aspects of Laanan's concept of social adjustment, particularly his incorporation of Oberg (1960) and Ward and Kennedy's (1993) theories of culture shock (Laanan, 2004, 2007), could be cast as an aspect of social integration (i.e., the process of developing a sense of social fit and connectedness at the receiving institution), Laanan does not explicitly reference Tinto. Instead, he builds largely on Astin's (1999) concept of involvement (Laanan, 2004). His measures of adjustment in the L-TSQ draw on both students' perceptions of the culture of the receiving institution and their own social adjustment, as well as their social behaviors at the receiving institution (Laanan, 2004). We therefore include Laanan's findings on community college transfer student social perceptions in this section and discuss his findings on their social behaviors in the section on involvement.

Measuring Social Integration

Researchers investigating community college transfer student social integration generally have relied on a variety of forms of student self-report, including surveys and questionnaires (e.g., Glass & Bunn, 1998; Harbin, 1997; Johnson-Benson, Geltner, & Steinberg, 2001; Laanan, 1996, 2004, 2007; McCormick et al., 2009; Townsend, 2008), interviews (e.g., Bahr et al., 2012; Flaga, 2006; Reyes, 2011; Townsend & Wilson, 2006b, 2009), focus groups (e.g., Davies & Dickmann, 1998; Johnson-Benson et al., 2001; Townsend, 2008), and, in one study, student “e-journaling” (Owens, 2010). In most cases, these studies were one-time data collection events. Only a few of the studies that we reviewed had collected data from the same students at multiple points in time to garner a longitudinal perspective on social transition processes (for exceptions, see Bahr et al., 2012; Flaga, 2006; Owens, 2010; Townsend & Wilson, 2009). Interestingly, none of the studies in our review collected data from students who had departed from the receiving institution, nor did they gather faculty or staff perspectives on community college transfer students’ social integration. Thus, the literature is largely missing insights into the social experiences of transfer students who do not persist, as well as the perspectives of faculty and staff on the role of social integration in community college transfer students’ outcomes.

The indicators that researchers have used to measure transfer student social integration have fallen into three general categories, some of which yield better information than do others about what Tinto would consider social integration. These categories include (1) students’ participation in formal, campus-based extra-curricular activities; (2) the degree to which students engage in informal social interaction at their new campus; and (3) students’ feelings of social connection or belonging at the receiving institution. The first two categories measure behaviors and therefore, we argue, are more appropriately treated as indicators of involvement. Consequently, we report those findings in the section on involvement. In this section, we follow the definition of integration proffered by Wolf-Wendel et al. (2009) and focus on measures from the third category, which centers on students’ perceptions.

Such measures of social integration have ranged from questions about students’ sense of belonging (e.g., Laanan, 1996, 2004; Reyes, 2011) or their self-reported ease of social adjustment (e.g., Johnson-Benson et al., 2001; Laanan, 1996, 2004, 2007) to how enjoyable they find campus life (e.g., Davies & Dickmann, 1998) and their overall satisfaction and likelihood of recommending the receiving institution to a friend (e.g., Berger & Malaney, 2003; Laanan, 1996, 2004). In some cases, researchers have been more specific, asking whether students have concerns about getting to know people or whether they feel marginalized or isolated (e.g., Harbin, 1997; Owens, 2010). Researchers using the NSSE have presented students’ rating of the quality of their campus relationships, including relationships with peers, in discussions of community college transfer students’ social integration (McCormick

et al., 2009). Finally, as part of their investigation of the relevance of social integration for community college transfer students' persistence, Townsend and Wilson (2009) asked students to explain what the term "social integration" meant to them. Such measures, which focus on students' subjective social experiences, have yielded important insights about the role of social integration in community college students' post-transfer transition processes.

Findings on Social Integration

Research on the social integration of community college transfer students has been driven by four central questions: (1) To what extent do community college students become socially integrated in the receiving four-year institution? (2) What are the barriers to social integration that these students face? (3) How important is it for community college students to become socially integrated in the receiving four-year institution? (4) What is the relationship between social and academic integration for these students? In this review, we synthesize the available research regarding each of these questions.

Extent of Social Integration

The evidence regarding the extent to which community college students become socially integrated at their receiving four-year institution is mixed, seemingly varying as a function of the characteristics of the individual transfer student as well as the program and institution into which he or she is transferring (Bahr et al., 2012; Reyes, 2011; Townsend & Wilson, 2009). A few studies assert that community college transfer students typically become socially integrated with relative ease (e.g., Glass & Bunn, 1998; Johnson-Benson et al., 2001). Furthermore, at least one study suggests that community college students become more socially integrated at their receiving four-year institution than they were at the community college, perhaps because they encounter more opportunities for social interaction and a culture that fosters sociability (Davies & Dickmann, 1998). However, despite evidence that many transfer students have positive perceptions of their social experiences at the receiving four-year institution, the majority of studies show that most transfer students experience difficulty integrating socially, particularly early in their transfer transition (Bahr et al., 2012; Harbin, 1997; Laanan, 1996; Owens, 2010; Reyes, 2011; Townsend & Wilson, 2006b, 2009).

Although there were many exceptions, even within individual studies, students of nontraditional age and/or from historically underrepresented groups appear to face more challenges integrating socially than do middle-class, traditional-aged, White students (e.g., Bahr et al., 2012; Davies & Dickmann, 1998; Owens, 2010; Reyes, 2011; Townsend & Wilson, 2009). In part, this might be because middle-class, traditional-aged students are more likely to have friends

from high school who already are enrolled at the receiving institution or other preexisting social networks, which likely influences the extent of social integration (Bahr et al., 2012; Flaga, 2006). While some research suggests that student demographic characteristics, such as age and ethnicity, do not necessarily affect post-transfer social adjustment (Laanan, 2007), other studies show that the interaction of race, gender, age, and/or socioeconomic status can influence profoundly the social experiences of transfer students, particularly in specific majors and programs that are populated overwhelmingly by White, male, and middle- or upper-class students (Reyes, 2011).

Barriers to Social Integration

Researchers have identified a number of factors that hinder community college students' social integration in the post-transfer period. These include environmental pull factors (discussed in detail later in this chapter), such as living off-campus (e.g., Bahr et al., 2012; Flaga, 2006; Townsend & Wilson, 2006b, 2009), family responsibilities (e.g., Bahr et al., 2012; Reyes, 2011), and needing to work while attending college, especially off-campus (e.g., Bahr et al., 2012; Owens, 2010; Reyes, 2011; Townsend & Wilson, 2009). These pull factors may present particular challenges for women, especially women of color, who sometimes face community expectations that they devote much of their time and energy to fulfilling family responsibilities (Reyes, 2011). Furthermore, some transfer students find that the workload and expectations at the receiving four-year institution are significantly more challenging than what they experienced at their community college. Adjusting to these new academic demands allows little time to invest in cultivating a campus social life, particularly if the students also are managing demands of work and home life (Davies & Dickmann, 1998). Finally, certain professional curricula at the receiving institution, such as teacher certification programs, have internship or practicum requirements that keep students off-campus 1 or more days each week, further hindering their ability to make on-campus social connections with peers (Bahr et al., 2012). This time off-campus is less of an obstacle for students who began their studies at the four-year institution, who have had at least 2 years to integrate into campus social life.

Other barriers to social integration spring from transfer students' status as late-comers to the four-year campus. Many community college students who transfer to large universities are daunted initially by the size of their new institution and may be unsure about how to navigate this new social environment (Owens, 2010; Townsend & Wilson, 2006b). Furthermore, students at the receiving institution who arrived as freshmen often already have their social structures in place and may not be invested in bringing new people into their circles (Bahr et al., 2012; Owens, 2010; Reyes, 2011; Townsend, 2008; Townsend & Wilson, 2006b). As Townsend and Wilson observe, this lack of social receptivity to transfer students can be an unintended consequence of the efforts of some universities to build community among "native" students during their first year in college: these students may have

bonded so tightly with their peers as freshmen that they are less open to making new friends by the time that they are juniors. Moreover, at some receiving institutions, campus social life might appear to revolve around Greek life or “partying” in a way that transfer students find unappealing (Townsend, 2008). Such social difficulties may be exacerbated at institutions that primarily serve traditional-aged students, where transfer students often are different from their new peers in terms of age (e.g., Bahr et al., 2012; Owens, 2010; Reyes, 2011; Townsend & Wilson, 2006b) and, in some cases, marital status (e.g., Bahr et al., 2012; Reyes, 2011) and parenting status (Reyes, 2011; Townsend & Wilson, 2006b, 2009). That is, community college transfer students may experience difficulty finding friends with whom they share similar life experiences.

Community college transfer students from underrepresented socioeconomic and/or racial/ethnic backgrounds may face an additional set of challenges to their social integration. Differences in socioeconomic status, particularly at selective four-year institutions, can foster resentment on the part of transfer students regarding the taken-for-granted privileges and elitist attitudes that they perceive among their new peers (e.g., Bahr et al., 2012; Harrison, 1999). The relative lack of visible diversity within the student body and among faculty at some receiving institutions also may leave transfer students feeling alienated or socially isolated (Bahr et al., 2012; Reyes, 2011). Furthermore, some transfer students experience overt social discrimination or exclusion at the receiving institution due to their race, gender, class, age, and/or immigrant or first-generation status, particularly if they are pursuing majors populated primarily by majority groups (Reyes, 2011).

Importance of Social Integration

While integrating socially might prove difficult for some community college transfer students, several researchers have suggested that social integration is not an important factor in these students’ decision to persist to degree completion (e.g., Bahr et al., 2012; Davies & Dickmann, 1998; Owens, 2010; Townsend & Wilson, 2009). According to this line of research, community college transfer students often do not consider campus social life a priority but, instead, are focused primarily on their academic and professional goals. In some cases, transfer students perceive campus social activities to be overemphasized at the receiving institution, or view socializing as a distraction from their academic pursuits (e.g., Davies & Dickmann; Owens).

Furthermore, some studies demonstrate that transfer students can be very successful academically despite feelings of social isolation and loneliness (e.g., Townsend & Wilson, 2009). Because they are so much closer to the end of their baccalaureate education by the time they enter the four-year institution than the “native” freshmen on whom Tinto based his theory of departure, many community college transfer students already are looking ahead to their lives and careers postgraduation, which provides them with ample motivation to persist, even if they do not become socially integrated at the receiving institution (Townsend & Wilson, 2009). On the other hand, there is some evidence that students from underrepresented socioeconomic and racial/ethnic backgrounds may have greater need to connect socially with other students who share similar backgrounds and experiences (Reyes, 2011).

The Relationship Between Academic and Social Integration

While social integration may not be as important for community college transfer students' baccalaureate attainment as it is for first-year students, some research suggests that academic integration and social integration are intertwined in distinctive ways for transfer students (e.g., Bahr et al., 2012; Davies & Dickmann, 1998; Townsend & Wilson, 2009). Prior to transfer, some activities, such as participation in study groups or friendships with classmates, facilitate both social and academic integration in ways that are mutually reinforcing and difficult to disentangle (Deil-Amen, 2005; Karp, Hughes, & O'Gara, 2010). After transfer, these forms of integration may continue to be tightly coupled for community college students (Laanan, 2004; Townsend & Wilson, 2009). Whether due to transfer students' limited time on campus, the culture of the community college from which they transferred, or some combination of these and other factors, Townsend and Wilson found that community college transfer students tended to have a "desire for socially-oriented academic integration" at the four-year institution (p. 419). That is, social integration arose from academic activities, primarily in classrooms, study groups, and clubs and activities related to their major.

Connections between the academic and social can help community college students to navigate the challenges of their new environment during the transfer transition. For example, some transfer students may be initially intimidated by the social dynamics of the larger classes, unavailable or distant faculty, and competitive academic culture in the receiving four-year institution, and the social connections that they develop in the classroom can help provide the motivation to forge ahead (Davies & Dickmann, 1998). Several studies identified particular academic experiences that also served as opportunities for social integration, including in-class collaborative learning (Townsend & Wilson, 2006b, 2009), experiences working in research labs (Reyes, 2011; Townsend & Wilson, 2009), and cohort models in professional programs that enabled students to take multiple classes in their major with the same group of students (Bahr et al., 2012; Reyes, 2011). Likewise, programs or learning opportunities that combine the goals of social and academic integration while also addressing the barriers to social integration faced by community college transfer students, such as paid research internships on campus that reduce the need to work off-campus, or seminars for transfer students on topics like women in the sciences, have shown promise for supporting the persistence of transfer students from underrepresented groups (Reyes, 2011).

Although some studies of community college transfer students' integration discuss the role of the receiving four-year institution in facilitating this process (Bahr et al., 2012; Townsend, 2008; Townsend & Wilson, 2006b, 2009), the concept of integration too often fails to take a critical view of the dominant cultural assumptions and social structures at the receiving institution. In later sections, we discuss the ways in which theories of capital might shed light on how certain kinds of cultural knowledge and social connections shape transfer students' academic and social experiences, as well as how studies of transfer receptivity reveal the receiving institution's responsibility for fostering transfer student integration. First, however, we focus on students' behaviors by examining the definition, measures, and findings surrounding community college transfer students' involvement in the four-year institution.

Involvement

Defining Involvement

As discussed previously, involvement is distinct from integration, focusing on students' *behavior* in the college setting rather than their sense of fit (Wolf-Wendel et al., 2009). Astin developed his theory of student involvement to explain the relationships between student characteristics, contextual factors, individual development (1999), and persistence in college (1975). He defined involvement as "the quantity and quality of the physical and psychological energy that students invest in the college experience" (1999, p. 529). Although Astin's definition of involvement is quite specific, the concept often has been poorly defined and haphazardly employed in both the literature on community college students' post-transfer transition processes specifically and in the higher education literature more broadly (Wolf-Wendel et al., 2009).

A key feature of Astin's (1999) theory is that involvement in college is part of a "zero-sum game" (p. 523). Students' time and energy are finite, and the resources that students invest in noncollege commitments (e.g., family, off-campus employment) represent costs against the time and energy that students devote to their educational experience. In other words, the extent to which students become involved in the academic and social aspects of college life reflects specific choices that they make about how to allocate limited resources. Thus, involvement theory places students' agency at the center of the academic experience, though educators are responsible for creating the conditions under which students are able to become involved in campus life and come to value that involvement (Astin, 1999; Hernandez, Hogan, Hathaway, & Lovell, 1999; Wolf-Wendel et al., 2009).

Astin (1999) was careful to differentiate involvement from motivation. Motivation implies a psychological state, while involvement suggests "the behavioral manifestation of that state" (Astin, p. 522). Thus, one of the primary theoretical distinctions between involvement and other concepts used to describe students' relationships to the college campus is that involvement refers to observable behaviors or actions that students themselves initiate. Perceptions and other affective dimensions of students' campus experiences fall within the domain of integration or other concepts.

Measuring Involvement

In developing his theory of student involvement, Astin (1999) intentionally eschewed more abstract psychological concepts, in part to facilitate measurement. Involvement may be measured both quantitatively and qualitatively, either through direct observation or via self-report (Astin, 2009). For example, a researcher might measure the amount of time that a student engages in a particular activity, such as hours spent studying or participating in extracurricular activities (e.g., Berger & Malaney, 2003; Laanan, 2007), or count how frequently a student accesses services such as advising or tutoring

(e.g., Glass & Bunn, 1998). Likewise, a researcher could examine qualitatively the decisions a student makes about how to allocate his or her time, such as choosing to join a student club or form a study group over watching television or taking on an extra shift at work (e.g., Davies & Casey, 1999; Reyes, 2011). As these examples suggest, student involvement, like integration, can be divided into two broad subcategories: academic involvement and social involvement.

Because involvement is comparatively easy to measure and has been linked empirically to a variety of positive postsecondary outcomes (e.g., Hernandez et al., 1999; Pascarella & Terenzini, 2005), measures of involvement have been incorporated into a number of large-scale data collection instruments. Two of the most relevant of these instruments for investigating community college students' post-transfer transition processes are Laanan's L-TSQ and the NSSE. These surveys provide helpful illustrations of how transfer student involvement might be measured thoroughly and systematically. Therefore, we present them here as case studies of sorts.

L-TSQ

The L-TSQ is designed to measure community college transfer students' adjustment process as a function of involvement, both pre- and post-transfer, and other factors. The L-TSQ contains a number of measures of academic involvement, such as the frequency of interactions with faculty and counselors, as well as measures of social involvement, such as time spent participating in clubs and activities, frequency of attendance of events sponsored by cultural groups, and time spent socializing informally (Laanan, 2004, 2007). These kinds of measures address the quantity of student involvement. However, Astin (1999) argued that student learning and development is "directly proportional to the quality *and* quantity of student involvement" (p. 519, italics added). As involvement has been operationalized in the literature, measures of *quantity* of effort have tended to eclipse attention to the *quality* of effort that students devote to college life (Wolf-Wendel et al., 2009). This tendency may be seen in studies that ask students to estimate the number of hours that they spend on various activities, both on- and off-campus, without distinguishing between the relative value of these various forms of involvement (e.g., Berger & Malaney, 2003; Ishitani & McKittrick, 2010).

In this regard, the L-TSQ instrument makes a unique contribution to the measures of involvement available in the literature on the post-transfer experiences of community college students. Laanan (2004, 2007) sought to disentangle quality of effort and quantity of effort by incorporating elements of Pace's (1980, 1984) *quality of effort* concept into his measures of students' involvement at the community college and the four-year institution. The L-TSQ measures quantity and quality of effort in four areas, including experiences with faculty, participation in clubs and organizations, course learning, and experience with academic counseling. Students are asked to indicate how often they pursue various activities such as visiting faculty; holding an office in a club, organization, or student government; taking notes in class; or meeting with counselors. Each of the individual items fit within a hierarchy of

effort in each of the four broad areas of involvement, with some activities requiring more effort than others (Laanan, 2004). Thus, quality of effort can be discerned by the frequency with which students participate in relatively more demanding activities. However, published studies that have used the L-TSQ (e.g., Laanan, 2007; Laanan, Starobin, & Eggleston, 2010) generally have not taken advantage of this distinctive property of the instrument to extricate quality of effort from the more commonly addressed quantity of effort.

NSSE

The primary distinction between the concepts of involvement and engagement, as defined in the NSSE, is that engagement focuses on student behaviors that have empirically demonstrated associations with learning outcomes (Axelson & Flick, 2010; Wolf-Wendel et al., 2009). The NSSE incorporates four dimensions of college student behavior that have been shown to foster learning, including level of academic challenge, active and collaborative learning, student-faculty interaction, and enriching educational experiences (Kuh, 2001a). A variety of survey items ask students to quantify their behaviors in each domain. For example, items from the student-faculty interaction dimension of the NSSE address many different forms of academic involvement, including discussing ideas from readings or courses outside of class and working with faculty members on activities other than coursework (Ishitani & McKittrick, 2010). Likewise, items from the enriching educational experiences dimension measure forms of social involvement, such as participation in cocurricular activities and campus-based community service. Because the NSSE focuses on forms of involvement that encourage learning, it incorporates a particularly rich group of measures on academic involvement.

While some higher education researchers have attempted to understand how the interplay of perceptions and behaviors affects educational outcomes by explicitly synthesizing elements of Tinto's (1993) interactionist model with Astin's (1999) involvement theory (e.g., Berger & Milem, 1999), it is more common for studies to mislabel measures of student involvement as indicators of integration. As noted in the integration section, this issue has been especially problematic in the literature on the post-transfer transition processes of community college students. These studies often have declared measures of the frequency or duration of student interactions with faculty, academic staff, and/or peers, as well as participation in study groups, group projects, and academic clubs, to be measures of academic integration (e.g., Flaga, 2006). Likewise, measures of the frequency and/or duration of student participation in formal, campus-based extracurricular activities (e.g., Flaga, 2006; Townsend & Wilson, 2009; Glass & Bunn, 1998) as well as informal socializing with peers (e.g., Flaga, 2006; Townsend & Wilson, 2006b) have been presented as measures of social integration. In order to disentangle the findings on integration and involvement in the post-transfer transition literature, we report the findings derived from these kinds of measures of student behaviors in this section on involvement, regardless of which concept researchers used to frame their studies.

Findings on Involvement

The findings of studies of community college transfer student involvement may be organized around three central questions: (1) What is the nature and extent of community college transfer students' academic and social involvement in the four-year institution? (2) What is the quality of effort exhibited in transfer students' involvement in the four-year institution? (3) What are the barriers to transfer student involvement? In this section, we synthesize the available research regarding each of these questions.

Extent of Involvement

Empirical evidence demonstrates clear associations between student involvement and a wide array of desirable outcomes in college (Pascarella & Terenzini, 2005; Wolf-Wendel et al., 2009). However, the research also suggests a high level of variability in the degree to which community college transfer students become academically and socially involved in the receiving four-year institution. While some studies suggest that community college transfer students become more involved in the four-year institution than they were in the community college (e.g., Berger & Malaney, 2003), other research suggests that these students may be less involved than their native classmates in the four-year institution (Ishitani & McKittrick, 2010). Furthermore, several studies suggest that community college transfer students are more likely to invest the bulk of their limited time and energy in academic activities, rather than social activities (e.g., Bahr et al., 2012; Townsend & Wilson, 2009).

Academic Involvement

A number of researchers have noted that community college transfer students often prioritize academic forms of involvement over social involvement (e.g., Bahr et al., 2012; Townsend & Wilson, 2009). The community college transfer students in Glass and Bunn's (1998) study, for example, were most likely to use the library and faculty advising services as compared with other support services, and the most common activities students pursued were related to their academic majors or to publications. Likewise, the community college transfer students that Townsend and Wilson interviewed, particularly the students of nontraditional age, tended to limit their campus involvement to activities in their departments or desired career fields. Furthermore, the extent of academic involvement appears to vary depending on enrollment status (full-time versus part-time) and class standing at the time of transfer. In one NSSE-based study, part-time transfer students and transfer sophomores were less academically involved than full-time and junior transfers on a variety of dimensions, including academic challenge, active and collaborative learning, and student-faculty interaction (Ishitani & McKittrick, 2010). This suggests a need for more

research into the patterns of academic involvement among various subpopulations of community college transfer students.

Of all the ways in which community college transfer students become academically involved, interactions with faculty may be the most daunting but also the most rewarding. For example, opportunities for transfer students to work on faculty research projects have been found to be a particularly rich source of academic support (Townsend & Wilson, 2009; Reyes, 2011). Although many community college students indicate that relationships with faculty are important for their academic success (Bahr et al., 2012; Laanan et al., 2010; Townsend & Wilson, 2009), research suggests that establishing mentoring relationships or getting to know faculty on a personal level may be more difficult and occur less frequently for community college transfer students (Matlock & Wade-Golden, 2009), especially for part-time transfer students (Ishitani & McKittrick, 2010). Of further concern are findings indicating that, because faculty often are easily accessible via email, transfer students are more likely to contact faculty virtually, rather than attending office hours or asking questions in person (Bahr et al., 2012; Davies & Casey, 1999). While email correspondence may increase the frequency with which students communicate with faculty, it is uncertain whether the quality of effort associated with these kinds of interactions will yield the same educational benefits as face-to-face contacts. More research into the role of electronically mediated academic involvement for community college transfer students is needed, particularly as more courses at four-year institutions are offered partially or completely online.

Participation in peer-based activities around academic or professional goals also is an important way for community college transfer students to find out about career opportunities and to meet fellow students with similar academic interests (e.g., Bahr et al., 2012; Flaga, 2006; Reyes, 2011). Likewise, participating in peer study groups has been found to support the persistence of community college transfer students at large research universities (Bahr et al., 2012; Matlock & Wade-Golden, 2009; Owens, 2010). Involvement in hybrid academic-social activities, such as discipline-focused clubs (Glass & Bunn, 1998), helps bridge the gap between academic and social integration, particularly for students who have little free time for social activities (e.g., Townsend & Wilson, 2009).

Social Involvement

Numerous positive outcomes are associated with social involvement in campus life for community college transfer students, including increased persistence (Wang, 2009), satisfaction at the four-year institution (Berger & Malaney, 2003), integration (Flaga, 2006; Townsend & Wilson, 2009), and adjustment (Laanan, 2007; Laanan & Starobin, 2004). For example, student activities and clubs can be an important opportunity to make friends and learn to negotiate the four-year institution, which in turn helps students feel more connected to the institution (Flaga, 2006; Laanan, 2007). The informal relationships that transfer students can develop through social activities are important, as researchers have found consistently that community college

transfer students most often turn to other students for information and advice on navigating the university (Bers et al., 2001; Flaga, 2006; Laanan & Starobin, 2004; Lee, 2001). Additionally, having peers with whom to spend time on campus, something residential students often take for granted, fosters community college transfer students' sense of social satisfaction and adjustment (Berger & Malaney, 2003; Laanan, 2007). However, several studies have found that at least some community college transfer students express little interest in social involvement at the four-year institution, preferring to focus on forms of academic involvement (e.g., Bahr et al., 2012; Davies & Dickmann, 1998; Townsend & Wilson, 2009).

Quality of Effort

The findings regarding quality of effort in community college transfer students' academic and social involvement are quite limited. Astin (1999) asserted that, because there are both quantitative and qualitative aspects of involvement, time on task does not necessarily lead to better academic outcomes. As noted previously, Laanan (2004, 2007) was the only researcher that we identified in our review of the literature who explicitly sought to measure quality as well as quantity of effort in transfer student involvement. While analyses of the impact of quality of effort on academic and social adjustment thus far have been limited, Laanan did find that time spent studying or doing homework and attending academic workshops was predictive of greater difficulty in community college students' adjustment to the university (Laanan, 2004).

However, rather than being taken as an indication that increased quality of effort in academic involvement negatively affects academic adjustment, Laanan's findings could be interpreted as an indication that transfer students who are experiencing academic difficulties tend to focus more on studying and homework, which is certainly an appropriate response (Laanan, 2004). While there is evidence that some community college transfer students who become highly socially involved at the four-year institution suffer academically (Berger & Malaney, 2003; Duggan & Pickering, 2008), perhaps because the resources that they devote to social activities reduce the quality and/or quantity of their academic involvement, researchers have yet to thoroughly investigate whether—and at what point—one form of involvement can become detrimental to the other (Hernandez et al., 1999). More research is needed on the impact of quality of effort, both between the two aspects of involvement and on the relationships between involvement, integration, and degree attainment.

Barriers to Involvement

The barriers to community college transfer students' academic and social involvement at the four-year institution are often the same factors that hinder their academic and social integration. Given that students' time and energy are finite resources (Astin, 1999), campus involvement necessitates a redistribution of priorities in other areas

of life. Due to outside commitments, or what we discuss as *environmental pull* factors later in this chapter, community college students often have significantly less time and energy to devote to college than do native students (Caporrimo, 2008), and these circumstances are unlikely to change post-transfer. Barriers to these students' involvement often include part-time enrollment status (Ishitani & McKittrick, 2010), off-campus residence and commuting (Bahr et al., 2012; Bers et al., 2001; Davies & Casey, 1999; Flaga, 2006; Harbin, 1997), off-campus employment (Berger & Malaney, 2003; Bers et al., 2001; Owens, 2010; Reyes, 2011; Townsend & Wilson, 2009), family responsibilities (Glass & Bunn, 1998; Reyes, 2011; Townsend & Wilson, 2009), and being of nontraditional age (Harbin, 1997; Owens, 2010).

Furthermore, some community college transfer students may be more likely to pursue forms of academic involvement rather than social involvement, particularly given the increased rigor in academic expectations that many encounter in the four-year institution (e.g., Bers et al., 2001). Case in point, Berger and Malaney (2003) found that community college students who transferred to the university tended to reduce outside commitments and increase study time in comparison to their levels of involvement in the community college. As a consequence of environmental pull factors and other barriers, many community college transfer students either are uninterested or unable to participate in campus social activities outside of class (Bahr et al., 2012; Bers et al., 2001; Davies & Casey, 1999; Glass & Bunn, 1998; Owens, 2010; Reyes, 2011; Townsend & Wilson, 2009).

Involvement theory is supported by a host of studies that have found that (traditional) students on (residential) campuses almost unequivocally benefit from opportunities for academic and social involvement (Pascarella & Terenzini, 2005). However, as this review has demonstrated, community college transfer students often differ from traditional students with respect to life circumstances and sociodemographic characteristics, and subpopulations of transfer students may exhibit differing levels of involvement. Furthermore, as we discuss in a later section, the cultures and resources at receiving four-year institutions vary as much as the students who choose to transfer to them. Insofar as community college transfer students are able to involve themselves in four-year institutions, the evidence suggests that both academic and social forms of involvement are beneficial to this population. Nonetheless, more investigation of how involvement differs among community college transfer students, as well as the educational practices that foster their involvement, is clearly warranted.

Environmental Pull

Defining Environmental Pull

Researchers investigating external influences on the persistence of underrepresented and nontraditional students in postsecondary education often have used the terms *environmental factors*, *environmental pull*, or *pull factors* to describe the competing

priorities and obligations that divert student time, energy, and commitment away from their academic goals (e.g., Arbona & Nora, 2007; Bean & Metzner, 1985; Cabrera, Nora, & Castañeda, 1992, 1993; Nora & Wedham, 1991; Nora, Cabrera, Hagedorn, & Pascarella, 1996). Bean and Metzner identified a number of environmental factors that pull nontraditional students away from the institution, including financial need (which can lead students to de-prioritize schooling in favor of work), off-campus employment, a lack of outside encouragement (or, in some cases, active discouragement from friends or family) to pursue their studies, and family responsibilities. Each of these factors, they found, could potentially work against a student's involvement thereby reducing his or her likelihood of persisting in college and completing a degree. Nora and his colleagues (e.g., Arbona & Nora, 2007; Cabrera et al., 1992, 1993; Nora, 1987, 2003; Nora & Wedham, 1991; Nora et al., 1996) have examined environmental pull factors for a variety of student subpopulations, including women and Hispanic and Latino/a students, at both two- and four-year institutions. These factors have included family responsibilities, which may be heightened by cultural expectations; personal, financial, or family crises; work/employment responsibilities, particularly off-campus; and the distance of a student's commute to campus. While some researchers have identified important ways in which family encouragement *supports* the academic success and persistence of many underrepresented students (e.g., Hurtado et al., 2007), it is clear that pull factors can present challenges to the academic success of nontraditional and first-generation college students.

Although few researchers who have examined the post-transfer transition processes of community college students have used the phrases *environmental pull* or *pull factors* to describe the external demands that work against transfer students' integration and involvement at receiving four-year institutions (for exceptions, see Reyes, 2011; Wang, 2009), many studies of community college transfer students consider variables and themes similar to those found in the broader higher education literature on environmental pull (e.g., Bahr et al., 2012; Davies & Dickmann, 1998; Flaga, 2006; Harbin, 1997; Townsend, 2008; Townsend & Wilson, 2006b, 2009; Owens, 2010; Wang, 2009; Wolf-Wendel, Twombly, Morpew, & Sopcich, 2004). In this section, we synthesize the literature on environmental pull as it pertains to the influence of these factors on community college students' abilities to integrate and become involved in four-year institutions. Further, we examine the evidence concerning the extent to which these factors influence students' baccalaureate attainment.

Measuring Environmental Pull

Studies of the post-transfer transition processes of community college students that examine what we refer to here as environmental pull have generally used surveys (e.g., Harbin, 1997; Wang, 2009), interviews (e.g., Bahr et al., 2012; Flaga, 2006; Townsend, 2008; Townsend & Wilson, 2006b, 2009; Wolf-Wendel et al., 2004), focus groups (e.g., Davies & Dickmann, 1998; Townsend, 2008), or student e-journals

(Owens, 2010) to measure many of the same external dimensions of students' experiences as other higher education literature dealing with environmental pull. These measures often deal with the logistics of being physically present at the transfer institution, such as whether students lived on- or off-campus (e.g., Bahr et al., 2012; Flaga, 2006; Reyes, 2011; Townsend, 2008; Townsend & Wilson, 2006b, 2009; Wolf-Wendel et al., 2004), whether and how many hours they worked off-campus (e.g., Bahr et al., 2012; Owens, 2010; Reyes, 2011; Townsend & Wilson, 2009; Wang, 2009), and whether and how far they commuted to campus (e.g., Bahr et al., 2012; Harbin, 1997; Reyes, 2011). Other measures have dealt more specifically with students' family situations, such as whether they were married (e.g., Bahr et al., 2012; Owens, 2010; Reyes, 2011), had children or other dependents (e.g., Bahr et al., 2012; Owens, 2010; Reyes, 2011; Townsend & Wilson, 2006b, 2009; Wang, 2009), or had other significant family or community responsibilities, often related to cultural and gender role expectations (e.g., Reyes, 2011). Several of these studies asked students specifically about their financial situation while in college (e.g., Reyes, 2011; Townsend & Wilson, 2009; Wolf-Wendel et al., 2004), and a few included measures of how supportive students' families were of their educational goals (e.g., Lee, 2001; Reyes, 2011).

Findings on Environmental Pull

The findings of studies that examine environmental pull and post-transfer transition processes suggest that community college transfer students often experience a great deal of environmental pull, particularly if they are nontraditional commuter students (e.g., Bahr et al., 2012; Owens, 2010; Reyes, 2011; Townsend, 2008; Townsend & Wilson, 2006b, 2009; Wolf-Wendel et al., 2004). The contrast between transfer students and "native" students in this regard was particularly stark at research universities where the "native" students were overwhelmingly of traditional age (e.g., Bahr et al., 2012; Reyes, 2011; Townsend, 2008; Townsend & Wilson, 2006b, 2009). Many transfer students reported that balancing off-campus employment and/or family obligations with coursework limited either their ability or their interest in spending additional time on campus (e.g., Bahr et al., 2012; Owens, 2010; Reyes, 2011; Townsend, 2008; Townsend & Wilson, 2006b, 2009). Commute time and difficulty parking on campus also dissuaded some students from coming to campus any more than necessary (e.g., Bahr et al., 2012; Reyes, 2011; Townsend, 2008; Townsend & Wilson, 2006b, 2009). While transfer students in some studies cited pressing financial concerns (e.g., Reyes, 2011; Wolf-Wendel et al., 2004), this was not the case in all studies (Townsend, 2008). Finally, findings regarding the role of family support were mixed. While some students expressed gratitude for the support of parents and spouses (e.g., Lee, 2001; Reyes, 2011), others suggested that they sometimes received contradictory signals from family members, who expressed support for the student's educational goals but still exerted pressure to contribute household income or were frustrated when the student was unavailable for family or cultural events (Reyes, 2011). Such pressures might be particularly acute for women of color (Reyes, 2011).

Although there is ample evidence that community college transfer students experience these pull factors, and that these factors are sources of stress for students during the transition process, it is less clear whether environmental pull exerts sufficient force to prevent students from completing their degrees. Wang (2009), for example, found that neither the number of hours worked nor having dependents predicted the likelihood that community college transfer students would complete a baccalaureate degree. However, Wang's study was based on NELS:88/00 data, which focus on traditional-aged students. Hence, she notes that the sample that she employed "is not representative of all community college transfer students" (p. 575).

Similarly, most of the student respondents in qualitative longitudinal studies of post-transfer transition processes persisted at the four-year institution, despite describing a wide array of environmental pull factors (e.g., Bahr et al., 2012; Reyes, 2011; Townsend & Wilson, 2009). It may be that students who persist in their post-secondary education long enough to transfer and successfully negotiate the initial transition to a four-year institution have sufficient resources, resiliency, and determination to balance—or at least to weather—the competing priorities in their lives long enough to complete their degrees. Further research that focuses specifically on quantifying the various effects of environment pull on community college transfer students' post-transfer transition processes and eventual completion of the baccalaureate is needed.

Capital

Defining Capital

Although theories of *capital* have been taken up widely in the research literature on community college students, comparatively few researchers have applied these theories to students' post-transfer experiences (for exceptions, see Laanan et al., 2010; Reyes, 2011; Wolf-Wendel et al., 2004). This is a significant shortcoming in the literature, not least because theories of capital have the potential to shift the analytical focus from students' behaviors to the ways in which receiving four-year institutions might privilege cultural knowledge and social connections that students from nontraditional or underrepresented backgrounds (who are overrepresented among community college students) are less likely to possess. Theories of capital, particularly Bourdieu's (1986) concepts of cultural capital and social capital, offer a useful framework for understanding the ways in which students' backgrounds combine with their pre-transfer socialization experiences at the community college to influence their academic and social experiences in the receiving four-year institution, as well as their longer-term professional and economic prospects.

Higher education researchers using theories of capital generally have drawn on the work of three scholars: Bourdieu (1986), Putnam (1995, 2001), and Becker (1993). Bourdieu hypothesized that unequal educational outcomes between children from different socioeconomic backgrounds could be explained in part by the differing

kinds of cultural and social capital transmitted to them by their families and communities. Bourdieu defined cultural capital as the knowledge, attitudes, manners, values, and tastes that are held by society's most wealthy and powerful classes. Like economic capital (i.e., financial resources), cultural capital is transmissible from person to person and from one generation to the next. Thus, students whose families already are wealthy in privileged forms of cultural capital tend to acquire more of it, from an earlier age, than children whose families possess less privileged forms of cultural capital. Because the education system generally operates from the cultural paradigm of the dominant class (Bourdieu, 1986), children who inherit more privileged forms of cultural capital—children who, in the United States, tend to be White and middle- or upper-class—are likely to be more successful in educational settings, including postsecondary education. Cultural capital can influence, for example, the extent to which a student's ways of speaking, conducting themselves in the classroom, and dressing conform to professors' typical expectations of college student behavior (Valadez, 1993).

Bourdieu (1986) also posited the related concept of social capital, defined as the network of existing or potential acquaintances—both informal and institutional—into which an individual is born and to which he or she adds through the cultivation of social, educational, and professional contacts over time. These sorts of connections provide or facilitate access to other forms of capital, including economic and cultural capital, and have particular implications for higher education, where students often are actively building the social and professional networks that will shape their lives and careers (Bourdieu, 1986). Access to social capital can affect, for example, whether students know someone who can provide help navigating the college application process (González, Stoner, & Jovel, 2003), or whether they know someone in a position to connect them with a prestigious internship (Reyes, 2011).

Putnam (1995, 2001) and Becker's (1993) theories of capital also have influenced research on community college students. Putnam, whose definition of social capital focused more on the value of social connections for group (rather than individual) well-being, described social capital as the "networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" (Putnam, 1995, p. 67). His definition emphasized the profit that accrues to both the individual and the group when members of a community engage with one another in a variety of formal and informal ways.

Becker's (1993) theory of human capital, on the other hand, took an economic rather than sociological approach, focusing on the social returns to investments in education and training, which improve the productivity, health, civic and cultural participation, and general well-being of the beneficiaries. Human capital is similar to cultural capital in that it emphasizes the economic benefits of privileged forms of knowledge and supports the value of educational access. However, Becker's human capital does not share Bourdieu's critical perspective on the role of class and cultural bias within what is often imagined to be a meritocratic educational system.

The widespread influence of these theories of cultural, social, and human capital has led education researchers to propose a number of other forms of capital that bear on the experiences of community college students, including academic capital (Hagedorn & Kress, 2008; Nuñez, 2008; St. John, Hu, & Fisher, 2011), emotional

capital (McGrath & Van Buskirk, 1999), and, most recently, transfer student capital (Laanan et al., 2010). Academic capital, although not clearly defined, has been used to describe the knowledge and abilities that enable success in academic contexts (e.g., Nuñez, 2008). Emotional capital, which McGrath and Van Buskirk (1999) based on Putnam's theories of social capital, is the "sense of trust, safety, and reciprocity that promotes involvement and commitment" resulting from the "strong social bonds, networks of small groups, and norms of reciprocity" (p. 17) that constitute social capital—in other words, the emotional rewards of having a social network that provide students with the motivation and sense of stability needed to succeed in higher education. Finally, transfer student capital, which Laanan et al. (2010) based on Becker's theory of human capital, is accumulated knowledge about how to negotiate the transfer process, which includes, for example, knowledge of interinstitutional credit transfer agreements, awareness of admission requirements for particular majors, and course prerequisites. In this model, the more transfer student capital a community college student possesses, the more likely he or she is to transfer successfully. Academic and transfer capital arguably may be considered forms of cultural capital, and emotional capital is defined as a dimension of social capital (McGrath & Van Buskirk, 1999). Regardless, each of these terms highlights forms of knowledge and dimensions of social connections that have some bearing on the academic success of community college students, either before, during, or after transfer.

Only a handful of studies have applied theories of capital to community college transfer (e.g., González et al., 2003; Laanan et al., 2010; Reyes, 2011; Trujillo & Diaz, 1999; Wassmer et al., 2004), and even fewer of those studies have focused on post-transfer transition processes (e.g., Laanan et al., 2010; Reyes, 2011; Wolf-Wendel et al., 2004). However, it is worth examining how these concepts have been used in the broader community college literature in order to explore their relevance to future research on the post-transfer transition processes of community college students.

Measuring Capital

Measuring Cultural Capital

At least one quantitative study that was framed in terms of capital theory used information about students' ethnic backgrounds as a proxy for cultural capital when comparing community college transfer rates (Wassmer et al., 2004). However, most community college-related studies that draw on theories of cultural capital have relied on qualitative methods, often interview-based or ethnographic in nature, to identify the ways in which cultural capital influences students' educational outcomes (e.g., Rhoads & Valadez, 1996; Trujillo & Diaz, 1999; Valadez, 1993, 1999; Wolf-Wendel et al., 2004). For example, some researchers have used interviews with administrators, faculty, and students, as well as classroom observations, to identify cultural biases in placement assessments, course content, and faculty attitudes that unintentionally privilege certain class-based behaviors and modes of expression, thereby penalizing students from less privileged socioeconomic

backgrounds (Rhoads & Valadez, 1996; Valadez, 1993). Another study used similar methods to identify gaps between the curricular content of a community college program and the forms of cultural capital that students actually need to improve their socioeconomic status (Valadez, 1999). Likewise, a study of a Hispanic-serving community college with an exceptionally high transfer rate used ethnographic methods to focus on how the historically undervalued cultural capital that students brought to the college was treated in both the formal and informal curriculum (Trujillo & Diaz, 1999). The prevalence of qualitative studies in the community college literature supports the conclusion that cultural capital is a complex concept that may be difficult to measure quantitatively; future studies of the role of cultural capital in the post-transfer transition processes of community college students might also favor qualitative approaches, particularly ethnographic studies, to gather in-depth information about the perspectives of students, faculty, staff, and administrators.

Measuring Social Capital

Quantitative studies often have used socioeconomic indicators, such as parental education, as proxies for social capital (e.g., Bers, 2005). Other researchers, however, have analyzed student interviews and life histories, as well as students' written responses to open-ended questions, for evidence about whether family members, teachers, counselors, honors or outreach programs, or other authority figures—people who Bensimon and Dowd (2009) call “transfer agents” (p. 615)—have helped students find resources and make decisions related to their college educations (e.g., González et al., 2003). In at least one case, ethnographic research at a Hispanic-serving community college drew on student interviews to look for ways in which the college's appreciation for students' cultural capital fostered a willingness to make social connections with other students, faculty, and staff (Trujillo & Diaz, 1999). Finally, some researchers have used theories of social capital to interpret their experiences developing and implementing specialized support programs for “at-risk” students, drawing on student interviews to reveal the processes by which the programs helped students make social connections with peers and faculty (McGrath & Van Buskirk, 1999; Reyes, 2011). Future studies of the role of social capital in community college students' post-transfer transition processes might draw on a range of qualitative and quantitative approaches, including surveys, interviews, and ethnographies, and might also use social network analysis methods (Kadushin, 2012) to examine various vehicles for building social connections, such as online social networking, in transfer students' acquisition and use of social capital.

Measuring Other Forms of Capital

Academic capital has been measured through traditional indicators of academic preparation, such as test scores or transcript analysis (e.g., Hagedorn & Kress, 2008). Other forms of capital, however, tend to employ more complex measures. McGrath and Van Buskirk (1999) developed their concept of emotional capital

through students' descriptions of their experiences drawing on college social networks for emotional support in the face of academic and personal challenges. Laanan et al. (2010) use four composite variables on the L-TSQ instrument to measure transfer student capital: "(a) academic counseling experiences; (b) perceptions of the transfer process; (c) experiences with faculty at a community college; and (d) learning and study skills acquired at a community college" (p. 182). Operationally, then, transfer student capital appears to measure knowledge that could be called academic capital, as well as specific procedural knowledge surrounding the transfer process to a specific four-year institution.

Findings on Capital

Theories of capital have provided useful theoretical frameworks for many community college researchers, and there is substantial evidence that these models have some explanatory power for understanding college choice behaviors, persistence, and likelihood of transfer for community college students, particularly those from nontraditional and/or underrepresented backgrounds (e.g., Bers, 2005; Bensimon & Dowd, 2009; González et al., 2003; McGrath & Van Buskirk, 1999; Valadez, 1993, 1999; Rhoads & Valadez, 1996; Trujillo & Diaz, 1999). Not surprisingly, many community college transfer students at four-year institutions come from cultural and socioeconomic backgrounds similar to the students in studies that focus on the community colleges (Cohen & Brawer, 2008), and they face a transition into four-year institutions for which they may not be equipped with forms of cultural capital that would help facilitate their success. Likewise, as newcomers to the institution who may not have access to the kinds of family connections, institutional resources, and peer networks that "native" students enjoy, community college transfer students often also lack the social capital from which their peers benefit.

The small number of studies that explicitly apply theories of capital to community college transfer student experiences presents a mixed picture, and one that is further complicated by the fact that different scholars have drawn on different theories of capital. On the one hand, women transferring from honors programs at urban community colleges to an elite New England liberal arts college did not seem to experience significant problems related to cultural capital (Wolf-Wendel et al., 2004). To the contrary, these (highly select group of) students succeeded both academically and socially and made important contributions to the culture of the college. On the other hand, the women of color participating in a program for community college transfer students in engineering at a southwestern research university reported great difficulties acquiring the social capital that they needed both to succeed in their majors and launch their careers (Reyes, 2011). Without the social support of the program, several suggested that they might have left the university altogether. Likewise, Laanan et al. (2010) found that several of the transfer student capital composite variables in their analysis were predictive of students' academic and social adjustment at the transfer institution, suggesting that these measures of transfer knowledge matter for students' experiences in the transition process.

Other studies of post-transfer transition processes that do not explicitly draw on theories of capital have yielded findings that also are relevant for these discussions. Flaga's (2006) dimensions of transition, which highlight the importance of connecting, gaining familiarity with, and negotiating the social, academic, and physical norms of the four-year institution, reveal the extent to which social capital facilitates transfer. Students in her study who already had friends or family members at the university often were able to move through these stages more quickly. Conversely, the transfer students in Owens' (2010) study encountered a great deal of frustration during the early stages of their transfer transition, both because they often lacked the social capital to know who to ask for help and because of a disjuncture between their cultural understandings of how the university ought to interact with students—what Owens called their “feelings of entitlement” (p. 101)—and the ways in which university faculty and staff understood their own roles. African American transfer students in Lee's (2001) study described similar cultural frustrations communicating with university staff, as well as difficulty knowing who to ask for help and an intense reliance on their peers for advising information (which itself represents a form of social capital). In fact, the importance of knowing social, cultural, institutional, and, in some cases, academic norms to the post-transfer transition process is a pervasive idea in qualitative studies of community college transfer students (e.g., Bahr et al., 2012; Flaga, 2006; Lee, 2001; Owens, 2010; Townsend, 1995, 2008; Townsend & Wilson, 2006b, 2009), and one that we agree is highly relevant and analytically useful.

Theories of capital have the potential to provide new insights into phenomena that have heretofore been attributed to issues of academic and social integration, thereby risking framing any difficulties experienced by community college transfer students as a lack of preparation or failure to adapt. By emphasizing the social and cultural dimensions of the post-transfer transition and the degree to which it is imbedded in structures of class privilege and racial and ethnic inequality, theories of capital may sidestep some of the limitations of individually oriented, psychosocial models that adopt unquestioned assumptions about the universal nature of norms and perspectives. Furthermore, given the role of postsecondary education—particularly four-year institutions—in providing students with opportunities to acquire the cultural and social capital from which they will launch their careers and professional lives, such theories may prompt researchers to ask whether transfer students who are “there to get an education,” but for various reasons are unable or unwilling to integrate socially, are really receiving the full and equitable benefits of a college degree.

Transfer Receptivity

Defining Transfer Receptivity

It is common for studies of community college students' post-transfer experiences to consider what the community college could have done to ease the transition to the four-year institution (e.g., Davies & Dickmann, 1998) or to include experiences at

the community college as predictors of outcomes at the four-year institution (e.g., Berger & Malaney, 2003; Glass & Bunn, 1998; Laanan, 2007; Laanan et al., 2010). Implicit in the designs of these studies is the assumption that community colleges bear a significant amount of the responsibility for how their students fare academically and socially in the post-transfer period. Accordingly, implications for improving students' transitions often are targeted toward the community colleges (e.g., Bensimon & Dowd, 2009; Davies & Dickmann, 1998; Glass & Bunn, 1998; Laanan & Starobin, 2004), toward community college students themselves (e.g., Harbin, 1997; Laanan, 2007), or toward the coordination between two- and four-year institutions (e.g., Bers et al., 2001; Caporrimo, 2008; Laanan, 1996; Townsend, 2008; Wolf-Wendel et al., 2004).

A growing line of research refocuses this discussion specifically on the role of four-year institutions in fostering community college transfer students' success. In that regard, *transfer receptivity* describes the "institutional commitment by a four-year college or university to provide the support needed for [community college] students to transfer successfully" (Jain et al., 2011, p. 253). Though a comparatively new perspective on community college post-transfer transition processes (Handel, 2011), the concept of transfer receptivity provides an important shift in the analytical lens from students' pre-transfer characteristics and post-transfer behaviors that characterizes the majority of the research on post-transfer transition processes to the institutional policies and practices of the receiving four-year institutions. It considers the influence of the campus culture of the four-year institution on community college transfer students and the effectiveness of various institutional supports (e.g., Handel, 2011; Laanan, 2007; Reyes, 2011; Ruiz & Pryor, 2011).

An important line of work in this area concerns the stigmatization of community college students in the four-year institution (e.g., Alexander, Ellis, & Mendoza-Denton, 2009; Bahr et al., 2012; Handel, 2011; Laanan, 2004; Laanan & Starobin, 2004; Laanan et al., 2010). The foundational work on the concept of stigma was conducted by Goffman (1963), who theorized that social settings carry expectations for the characteristics and qualities of individuals found in those settings. Consequently, in any given social setting, individuals will have a *virtual* social identity, which encompasses the characteristics and qualities expected of an individual found in that setting, and an *actual* social identity, which describes the characteristics and qualities truly held by the individual. Stigma is a result of an unfavorable disjuncture between an individual's virtual social identity and his or her actual social identity in a given social situation. Thus, stigma represents one important aspect of the concept of transfer receptivity insofar as the culture and structure of a four-year institution maintains or supports an implicit expectation of student "native" status.

Measuring Transfer Receptivity

The subject of the stigmatization of community college transfer students in the four-year institution appears to be a promising direction of research, though an understudied one at this point. One of the few systematic efforts to collect data

on transfer student stigma was conducted by Laanan (2004), who incorporated perceptions of stigmatization as one component of “general perceptions [of the transfer university]” in the L-TSQ instrument. Further, Laanan differentiated between perceptions of stigma experienced in students’ relationships with peers and those experienced with faculty.

In a similar vein, using a web-based survey administered to graduating transfer students, Alexander et al. (2009) asked students to describe situations in which they felt rejected based on their transfer status or felt the need to conceal their identities as community college transfer students. Though useful, one limitation of their questionnaire is that it did not specify whether students’ perceptions of stigma were a result of interactions with peers, with faculty, or both. Given that stigma is tied to expectations within a particular social setting, such clarification would be necessary in order to identify the source of the problem in the four-year institution and improve transfer receptivity.

In yet another effort, the Higher Education Research Institute (HERI) recently developed the Diverse Learning Environments Survey (DLE), which can be used in part to assess the reception that community college transfer students receive at the four-year institution (Ruiz & Pryor, 2011). The module for transfer students includes relevant items such as “How often have you felt excluded from campus events because you are a transfer student?” (Higher Education Research Institute, 2012).

Finally, several studies that used qualitative designs have probed whether community college transfer students feel stigmatized at the receiving four-year institution, and, if so, in what ways stigma has had an impact on their outcomes. Researchers have used both focus groups (e.g., Bers et al., 2001; Townsend, 2008) and interviews (e.g., Bahr et al., 2012) to address stigma at receiving institutions. For example, in a series of longitudinal interviews, Bahr and his colleagues asked community college transfer students whether they thought “that students who transfer from a community college are perceived any differently here [relative to] students who begin their college attendance in [the focal institution]” (p. 50).

Findings on Transfer Receptivity

Documentation of experiences of stigmatization among community college transfer students at their receiving four-year institutions varies, with some studies finding that students experience stigma (e.g., Alexander et al., 2009; Bahr et al., 2012) and others finding little evidence of this experience (e.g., Laanan & Starobin, 2004; Townsend, 2008). As an example of the former case, Alexander and colleagues found that about one-quarter of community college transfer students at the University of California, Berkley—where transfer students constitute 33% of the student population—described feeling a sense of rejection based on their status as transfer students. Additionally, 18.8% of participants described concealing their identities as transfer students. It seems likely that, as researchers continue to pursue this line of

inquiry, differences in the institutional cultures at receiving four-year institutions will emerge as a key factor in predicting the prevalence of stigma.

The consequences of stigmatization for community college transfer students remain unclear at this point. Laanan and colleagues (2010) found that feelings of stigmatization associated with transfer status had a negative impact on students' academic adjustment in the four-year institution, but it is uncertain whether stigma ultimately influences community college transfer students' academic performance or likelihood of completing a baccalaureate degree.

In terms of improving institutional transfer receptivity, including minimizing stigma associated with transfer status, though student services would be the natural place to house programs that would improve transfer reception, comparatively few four-year institutions provide specialized support programs for community college transfer students (Eggleston & Laanan, 2001). Orientation programs (e.g., Glass & Bunn, 1998; Harbin, 1997; Laanan & Starobin, 2004) and academic advising (e.g., Bahr et al., 2012; Bers et al., 2001; Davies & Dickmann, 1998) are among the few student services in which community college transfer students have been found consistently to participate across multiple studies, with mixed results as to their perceived usefulness and ease of access (Eggleston & Laanan, 2001; Flaga, 2006; Harbin, 1997; Lee, 2001; Owens, 2010).

Bensimon and Dowd (2009) argue that many community college students who transfer to four-year institutions are exceptionally self-sufficient and therefore may not recognize that they need help, let alone know how to find it in the receiving institution. Nevertheless, findings from a number of qualitative studies indicate that community college transfer students desire more assistance in the receiving institution (e.g., Lee, 2001; Townsend & Wilson, 2009), such as more interaction with academic advisors (e.g., Davies & Dickmann, 1998; Owens, 2010) or peer mentors (e.g., Flaga, 2006; Owens, 2010). However, even if such services are available, students may not be aware of them (e.g., Bers et al., 2001; Glass & Bunn, 1998), may find them difficult to access them due to scheduling constraints (e.g., Davies & Dickmann), or may be wary of receiving incorrect information (e.g., Davies & Casey, 1999). Notably, two studies (Bahr et al., 2012; Lee, 2001) found that students occasionally sought advice and information from their former community colleges when they were unable to access the information that they needed at the receiving four-year institution.

Overall, researchers have yet to reach consensus on the prevalence of stigma attached to community college transfer status or its effects on students' outcomes, in part, we suspect, due to the heterogeneity of transfer students and receiving institutions. In addition, issues of stigma represent only one aspect of a line of work on institutional transfer receptivity that is sorely underdeveloped at this point but also sorely needed, including research to identify effective student services for community college transfer students and the appropriate methods and timing for the delivery of those services. For example, a student in one study mentioned that it would have been helpful if transfer orientation activities were held in the evening so as not to conflict with transfer students' work schedules (Davies & Casey, 1999). Addressing even simple logistical issues of this sort, which provide a smoother and clearer path

for community college transfer students' transition, will contribute to improving the transfer receptivity of the four-year institution, though this should be considered only a first step in a larger process of adjusting policies and practices to facilitate the success of community college transfer students.

Recommendations for Future Research

Our objective for this chapter was to knit together the diverse and often fragmented body of research literature on the post-transfer transition processes of community college students, particularly as it pertains to the five concepts that appear (or are alluded to) repeatedly in that literature: integration, involvement, environmental pull, capital, and transfer receptivity. Our hope is that this chapter will serve as a foundation for future research, and, in that regard, we offer several recommendations.

First and foremost, we recognize that research on post-transfer transition processes likely will continue to be driven primarily by single-institution studies, at least for the foreseeable future. There are a few notable exceptions (e.g., McCormick et al., 2009), but many of the current lines of questions about community college students' post-transfer transition processes, such as how best to structure support services, are principally institution specific in nature. One positive result of the preponderance of single-institution studies is the great variety of data collection methods evident in the literature, especially the variety of qualitative methods. One important downside, however, is a proliferation of differing data collection instruments and interview protocols that frequently do not exhibit clear and effective operationalization of the core concepts addressed in the literature, including the five concepts that we have discussed in this chapter. Consequently, it is difficult to compare and contrast findings across studies, largely because the strength and quality of connections between measures and underlying concepts varies greatly across instruments. Moreover, some studies purport to address one concept but, in fact, measure an entirely different concept, limiting the illumination that they can provide and injecting additional confusion into a body of literature that already is somewhat disjointed.

What is needed at this time is collaboration among researchers to construct a common set of data collection instruments, including both a quantitatively oriented survey instrument and a qualitatively oriented interview protocol, that can be employed across institutions and across studies to measure the core concepts addressed in this chapter as they relate to community college students' post-transfer transition processes. The critical step in the process of constructing these instruments will be the development of a comprehensive set of unambiguous measures for each dimension of each concept and the clear articulation of the correspondence between measures and dimensions, hence our effort in this chapter to identify and define the core concepts and to explain how they have been operationalized (with varying levels of effectiveness) in the literature. For example, advancement of inquiry into students' post-transfer integration will be served best by agreement among researchers about the most valid and reliable measures of the academic and social dimensions of this frequently contested and often poorly operationalized

concept and the subsequent use of these measures in multiple studies of community college transfer students in a variety of four-year institutions.

Fortunately, some of the work of developing measures already has been accomplished. In that regard, we recommend Laanan's Transfer Students' Questionnaire (L-TSQ; Laanan, 2004) and the National Survey of Student Engagement (NSSE; Kuh, 2001b) as foundational pieces on which to begin to build a common quantitative survey instrument. Likewise, we recommend the protocol developed by Bahr and his colleagues (2012) as a foundational piece for beginning to build a common qualitative interview protocol. Although none of these instruments offers a complete set of measures for all of the concepts discussed in this chapter, and some of the core concepts are not addressed in any of these instruments, nevertheless each would contribute in important ways to the development of a common set of data collection instruments.

To be clear, though, simply amassing a set of measures from these existing instruments will not rectify the problem described here. Instead, measures of each conceptual dimension must be selected (or developed) carefully and thoughtfully, and the relationship between each dimension and the corresponding measures must be clearly articulated. The absence of such a vigilant operationalization process is a recurrent and particularly problematic issue in the literature in this area, and one that we hope will be resolved by the collaboration of researchers in developing a common set of data collection instruments.

Second, the literature on community college students' post-transfer transition processes is dominated by cross-sectional research (i.e., single-survey or "one-shot" research designs), although there are a number of notable exceptions that have employed longitudinal (panel) designs, collecting data from the same students at multiple points in time (e.g., Bahr et al., 2012; Flaga, 2006; Ishitani, 2008; Owens, 2010; Townsend & Wilson, 2009). This is an important weakness of the literature insofar as the *process* of transition, by definition, unfolds over time. Findings about processes that are drawn from cross-sectional studies, including studies of the post-transfer transition processes discussed in this chapter, inevitably must rely on the conjecture of the researcher, who imposes processual interpretations and explanations on a snapshot of information collected at just one point in time. Thus, we recommend that, whenever feasible, researchers design their studies to collect data at multiple points in time from the same students in order to "deconstruct" the transitional process, including the evolution of students' adjustment and the many decision points through which they move between the community college and the four-year institution and within the four-year institution itself (Bahr, 2013c).

Finally, although there are a number of exceptions (e.g., Bahr et al., 2012; Reyes, 2011; Townsend & Wilson, 2006b), the literature on post-transfer transition processes tends to homogenize community college transfer students, though they are, in fact, a highly diverse group that includes a wide range of ages, racial, ethnic, and cultural identities and socioeconomic backgrounds, among other varying characteristics. All of these characteristics have important implications for community college students' expectations and experiences in the four-year institution, but, by and large, the literature has paid insufficient attention to the post-transfer transition processes of particular subpopulations of community college transfer students. This

weakness is particularly evident in the quantitative literature, where one finds that key student characteristics are treated most often as statistical controls for a given outcome of interest, invoking the implicit assumption that the underlying processes are similar for differing subpopulations of community college transfer students.

In a similar vein, studies of community college transfer students in specific majors and professional programs are comparatively rare in the larger body of literature (some exceptions include Bahr et al., 2012; Cameron, 2005; Reyes, 2011). Yet, these studies have provided valuable insights about the development of professional identities and the influence of prevailing demographics in professional fields on transfer students' experiences. Likewise, these studies suggest that transfer students' transition experiences often differ depending on discipline-specific curricula, pedagogical approaches, and classroom assessment practices (e.g., Gere, Toth, & Swofford, 2012). Consequently, we recommend that researchers incorporate into the designs of future studies the capacity to disentangle differences in post-transfer transition processes across varying student characteristics (e.g., age, race/ethnicity, socioeconomic status) and across differing programs of study. We expect that this effort will contribute to resolving some of the many inconsistencies in findings across studies concerning the five core concepts discussed in this chapter.

Acknowledgements The authors gratefully acknowledge the contributions of Brett Griffiths and Inger Bergom to the development of this work.

Endnote

1. To be clear, Alba and Lavin (1981) compared community college students and four-year students from several different angles, producing a number of important findings, but the portion of their study that focused on community college students who actually transferred to a four-year institution found minimal differences in baccalaureate attainment, relative to comparable peers who began in a four-year institution.

References

- Adelman, C. (2005). Educational 'anticipations' of traditional age community college students: A prolegomena to any future accountability indicators. *Journal of Applied Research in the Community College*, 12, 93–107.
- Alba, R. D., & Lavin, D. E. (1981). Community colleges and tracking in higher education. *Sociology of Education*, 54, 223–237.
- Alexander, F. E. (2000). The changing face of accountability: Monitoring and assessing institutional performance in higher education. *Journal of Higher Education*, 71, 411–431.
- Alexander, K., Bozick, R., & Entwisle, D. (2008). Warming up, cooling out, or holding steady? Persistence and change in educational expectations after high school. *Sociology of Education*, 81, 371–396.
- Alexander, S., Ellis, D., & Mendoza-Denton, R. (2009). *Transfer student experiences and success at Berkeley* (CSHE.3.2009). Retrieved from <http://cshe.berkeley.edu/publications/docs/ROPS-AlexanderEllis-Transfer-03-31.pdf>

- Alfonso, M. (2006). The impact of community college attendance on baccalaureate attainment. *Research in Higher Education*, 47, 873–903.
- American Association of Community Colleges. (2012). *Community college fact sheet*. Washington, DC: American Association of Community Colleges. Retrieved from <http://www.aacc.nche.edu/AboutCC/Documents/FactSheet2012.pdf>
- Aragon, S. R., & Perez, M. R. (2006). Increasing retention and success of students of color at research-extensive universities. *New Directions for Student Services*, 114, 81–91.
- Arbona, C., & Nora, A. (2007). The influence of academic and environmental factors on Hispanic college degree attainment. *The Review of Higher Education*, 30, 247–269.
- Armstrong, W. B. (1993). Accountability and a unitary transfer definition. *Community College Review*, 20, 59–68.
- Astin, A. W. (1975). *Preventing students from dropping out*. San Francisco: Jossey-Bass.
- Astin, A. W. (1999). Student involvement: A developmental theory for higher education. *Journal of College Student Development*, 40, 518–529.
- Axelson, R. D., & Flick, A. (2010). Defining student engagement. *Change*, 43, 38–43.
- Bahr, P. R. (2008a). Cooling out in the community college: What is the effect of academic advising on students' chances of success? *Research in Higher Education*, 49, 704–732.
- Bahr, P. R. (2008b). Does mathematics remediation work?: A comparative analysis of academic attainment among community college students. *Research in Higher Education*, 49, 420–450.
- Bahr, P. R. (2010a). Revising the efficacy of postsecondary remediation: The moderating effects of depth/breadth of deficiency. *The Review of Higher Education*, 33, 177–205.
- Bahr, P. R. (2010b). Preparing the underprepared: An analysis of racial disparities in postsecondary mathematics remediation. *Journal of Higher Education*, 81, 209–237.
- Bahr, P. R. (2013a). Classifying community colleges based on students' patterns of use. *Research in Higher Education*, 54 (in press).
- Bahr, P. R. (2013b). The aftermath of remedial math: Investigating the low rate of certificate completion among remedial math students. *Research in Higher Education*, 54 (in press).
- Bahr, P. R. (2013c). The deconstructive approach to understanding community college students' pathways and outcomes. *Community College Review*, 41 (in press).
- Bahr, P. R., Hom, W., & Perry, P. (2005). College transfer performance: A methodology for equitable measurement and comparison. *Journal of Applied Research in the Community College*, 13, 73–87.
- Bahr, P. R., Massé, J. C., Christensen, R., Griffiths, B., Toth, C., Thirolf, K., et al. (2012). *Transition processes of transfer students in the School of Education at the University of Michigan*. Ann Arbor, MI: Center for the Study of Higher and Postsecondary Education, University of Michigan, Ann Arbor.
- Bailey, T., Calcagno, J. C., Jenkins, D., Leinbach, T., & Kienzl, G. (2006). Is student-right-to-know all you should know?: An analysis of community college graduation rates. *Research in Higher Education*, 47, 491–519.
- Bailey, T., Jeong, D. W., & Cho, S. (2010). Referral, enrollment, and completion in developmental education sequences in community colleges. *Economics of Education Review*, 29, 255–270.
- Bailey, T., & Weininger, E. B. (2002). Performance, graduation, and transfer of immigrants and natives in City University of New York community colleges. *Educational Evaluation and Policy Analysis*, 24, 359–377.
- Baker, T. L., & Vélez, W. (1996). Access to and opportunity in postsecondary education in the United States: A review. *Sociology of Education*, 69, 82–101.
- Beach, K. D. (1999). Consequential transitions: A sociocultural expedition beyond transfer in education. *Review of Research in Education*, 24, 101–139.
- Bean, J. P., & Metzner, B. S. (1985). A conceptual model of nontraditional undergraduate student attrition. *Review of Educational Research*, 55, 485–540.
- Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis with special reference to education* (3rd ed.). Chicago: University of Chicago Press.
- Bensimon, E., & Dowd, A. C. (2009). Dimensions of the transfer choice gap: Experiences of Latina and Latino students who navigated transfer pathways. *Harvard Educational Review*, 79, 632–658.

- Berger, J. B., & Malaney, G. D. (2003). Assessing the transition of transfer students from community colleges to a university. *NASPA Journal*, 40, 1–23.
- Berger, J. B., & Milem, J. F. (1999). The role of student involvement and perceptions of integration in a causal model of student persistence. *Research in Higher Education*, 40, 641–664.
- Bers, T. (2005). Parents of traditionally aged community college students: Communications and choice. *Research in Higher Education*, 46, 413–436.
- Bers, T., Filkins, J. W., & McLaughlin, G. W. (2001). Understanding transfers: A collaborative community college and university research project. *Journal of Applied Research in the Community College*, 8, 93–105.
- Best, G. A., & Gehring, D. D. (1993). The academic performance of community college transfer students at a major state university in Kentucky. *Community College Review*, 21, 32–41.
- Bourdieu, P. (1986). The forms of capital. In J. G. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241–258). Westport, CT: Greenwood Press.
- Cabrera, A. F., Burkum, K. R., & La Nasa, S. M. (2005). Pathways to a four-year degree: Determinants of transfer and degree completion. In A. Seidman (Ed.), *College student retention: Formula for student success* (pp. 155–213). Westport, CT: Praeger.
- Cabrera, A. F., Castañeda, M. B., Nora, A., & Hengstler, D. (1992). The convergence between two theories of college persistence. *Journal of Higher Education*, 63, 143–164.
- Cabrera, A. F., Nora, A., & Castañeda, M. B. (1992). The role of finances in the persistence process: A structural model. *Research in Higher Education*, 33, 571–593.
- Cabrera, A. F., Nora, A., & Castañeda, M. B. (1993). College persistence: Structural equations modeling test of an integrated model of student retention. *Journal of Higher Education*, 64, 23–139.
- Cameron, C. (2005). Experiences of transfer students in a collaborative baccalaureate nursing program. *Community College Review*, 33, 22–44.
- Caporrimo, R. (2008). Community college students: Perceptions and paradoxes. *Community College Journal of Research and Practice*, 32, 25–37.
- Carlan, P. E., & Byxbe, F. R. (2000). Community colleges under the microscope: An analysis of performance predictors for native and transfer students. *Community College Review*, 28, 27–42.
- Cejda, B. D. (1997). An examination of transfer shock in academic disciplines. *Community College Journal of Research and Practice*, 21, 279–288.
- Cejda, B. D., & Kaylor, A. J. (1997). Academic performance of community college transfer students at private liberal arts colleges. *Community College Journal of Research and Practice*, 21, 651–659.
- Cejda, B. D., Kaylor, A. J., & Rewey, K. L. (1998). Transfer shock in an academic discipline: The relationship between students' majors and their academic performance. *Community College Review*, 26, 1–13.
- Cejda, B. D., Rewey, K. L., & Kaylor, A. J. (1998). The effect of academic factors on transfer student persistence and graduation: A community college to liberal arts college case study. *Community College Journal of Research and Practice*, 22, 675–686.
- Cohen, A. M., & Brawer, F. B. (2008). *The American community college* (5th ed.). San Francisco: Jossey-Bass.
- Davies, T. G., & Casey, K. (1999). Transfer student experiences: Comparing their academic and social lives at the community college and university. *College Student Journal*, 33, 60–71.
- Davies, T. G., & Dickmann, E. M. (1998). Student voices in the transfer process: Do we hear them? Do we listen? *Community College Journal of Research and Practice*, 22, 541–557.
- Deil-Amen, R. (2005, August 13–16). *Do traditional models of college dropout apply to non-traditional students at non-traditional colleges?* Paper presented at the annual meeting of the American Sociological Association, Philadelphia.
- Diaz, P. E. (1992). Effects of transfer on academic performance of community college students at the four-year institution. *Community/Junior College Quarterly*, 16, 279–291.
- Dougherty, K. (1987). The effects of community colleges: Aid or hindrance to socioeconomic attainment? *Sociology of Education*, 60, 86–103.

- Dougherty, K. J., Hare, R., & Natow, R. S. (2009). *Performance accountability systems for community colleges: Lessons from ten states*. New York: Community College Research Center, Teachers College, Columbia University. Retrieved from: <http://www.aacc.nche.edu/Resources/aaccprograms/VFAWeb/Documents/Lessons%20from%2010%20States.pdf>
- Dougherty, K. J., & Hong, E. (2006). Performance accountability as imperfect panacea: The community college experience. In T. Bailey & V. S. Morest (Eds.), *Defending the community college equity agenda* (pp. 51–86). Baltimore: Johns Hopkins University Press.
- Dougherty, K. J., & Kienzl, G. S. (2006). It's not enough to get through the open door: Inequalities by social background in transfer from community colleges to four-year colleges. *Teachers College Record*, 108, 452–487.
- Dowd, A. C., Cheslock, J. J., & Melguizo, T. (2008). Transfer access from community colleges and the distribution of elite higher education. *Journal of Higher Education*, 79, 442–472.
- Dowd, A. C., & Melguizo, T. (2008). Socioeconomic stratification of community college transfer success in the 1980s and 1990s: Evidence from HS&B and NELS. *The Review of Higher Education*, 31, 377–400.
- Doyle, W. R. (2009). Impact of increased academic intensity on transfer rates: An application of matching estimators to student-unit record data. *Research in Higher Education*, 50, 52–72.
- Doyle, W. R. (2011). Effects of increased academic momentum on transfer rates: An application of the generalized propensity score. *Economics of Education Review*, 30, 191–200.
- Duggan, M. H., & Pickering, J. W. (2008). Barriers to transfer student academic success and retention. *Journal of College Student Retention*, 9, 437–459.
- Durkheim, E. (1961). *Suicide* (J. Spaulding & G. Simpson, Trans.). Glencoe, IL: The Free Press.
- Dworkin, S. (1996). Persistence by 2-year college graduates to 4-year colleges and universities. *Community College Journal of Research and Practice*, 20, 445–454.
- Eagan, M. K., Jr., & Jaeger, A. J. (2009). Effects of exposure to part-time faculty on community college transfer. *Research in Higher Education*, 50, 168–188.
- Eggleston, L. E., & Laanan, F. S. (2001). Making the transition to the senior institution. *New Directions for Community Colleges*, 114, 87–97.
- Ehrenberg, R. G., & Smith, C. L. (2004). Analyzing the success of student transitions from 2- to 4-year institutions within a state. *Economics of Education Review*, 23, 11–28.
- Fabes, B., & Mattoon, R. H. (2007). *Measuring community college performance*. Chicago: Federal Reserve Bank of Chicago. Retrieved from: <http://www.ccachicago.org/sites/default/files/Chicago%20Fed%20Letter%20-%20Measuring%20community%20college%20performance.pdf>
- Falconetti, A. M. G. (2009). 2+2 statewide articulation policy, student persistence, and success in Florida Universities. *Community College Journal of Research and Practice*, 33, 238–255.
- Flaga, C. T. (2006). The process of transition for community college transfer students. *Community College Journal of Research and Practice*, 30, 3–19.
- Freeman, M. L., Conley, V. M., & Brooks, G. P. (2006). Successful vertical transitions: What separates community college transfers who earn the baccalaureate from those who don't? *Journal of Applied Research in the Community College*, 13, 141–150.
- Gawley, T., & McGowan, R. A. (2006). Learning the ropes: A case study of the academic and social experiences of college transfer students within a developing university-college articulation framework. *College Quarterly*, 9 (ERIC Document Reproduction Service No. EJ835416).
- Gere, A. R., Toth, C. M., & Swofford, S. C. (2012, July). *Afterward: Post-transfer writers*. Presentation at the annual meeting of the Council of Writing Program Administrators, Albuquerque, NM.
- Glass, J. C., Jr., & Bunn, C. E. (1998). Length of time required to graduate for community college students transferring to senior institutions. *Community College Journal of Research and Practice*, 22, 239–263.
- Glass, J. C., Jr., & Harrington, A. R. (2002). Academic performance of community college transfer students and “native” students at a large state university. *Community College Journal of Research and Practice*, 26, 415–430.

- Goffman, E. (1963). *Stigma: Notes on the management of spoiled identity*. New York: Simon & Schuster.
- Goldberger, S. (2007). *Power tools: Designing state community college data and performance measurement systems to increase student success*. Boston: Jobs for the Future. Retrieved from: <http://www.jff.org/sites/default/files/PowerTools.pdf>
- González, K. P., Stoner, C., & Jovel, J. E. (2003). Examining the role of social capital in access to college for Latinas: Toward a college opportunity framework. *Journal of Hispanic Higher Education*, 2, 146–170.
- Grubb, W. N. (1991). The decline of community college transfer rates. *Journal of Higher Education*, 62, 194–222.
- Hagedorn, L. S. (2010). The pursuit of student success: The directions and challenges facing community colleges. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 25, pp. 181–218). Dordrecht, The Netherlands: Springer.
- Hagedorn, L. S., & Kress, A. M. (2008). Using transcripts in analyses: Directions and opportunities. *New Directions for Community Colleges*, 143, 7–17.
- Hagedorn, L. S., Moon, H. S., Cypers, S., Maxwell, W. E., & Lester, J. (2006). Transfer between community colleges and 4-year colleges: The all-American game. *Community College Journal of Research and Practice*, 30, 223–242.
- Handel, S. (2011). *Improving student transfer from community colleges to four-year institutions – The perspective of leaders from baccalaureate-granting institutions*. Washington, DC: The College Board.
- Harbin, C. E. (1997). A survey of transfer students at four-year institutions serving a California community college. *Community College Review*, 25, 21–40.
- Harbour, C. P. (2003). An institutional accountability model for community colleges. *Community College Journal of Research and Practice*, 27, 299–316.
- Harrison, P. L. (1999). *Transition experience of community college students: A qualitative study*. Unpublished doctoral dissertation, University of Virginia, Charlottesville, VA.
- Hernandez, K., Hogan, S., Hathaway, C., & Lovell, C. D. (1999). Analysis of the literature on the impact of student involvement on student development and learning: More questions than answers? *NASPA Journal*, 36, 184–197.
- Higher Education Research Institute. (2012). *Diverse learning environments survey* [Climate for transfer students at 4-year institutions module]. Retrieved from <http://www.heri.ucla.edu/PDFs/surveyAdmin/dle/DLE12ClimateForTransfer4yr.pdf>
- Hom, W. C. (2009). The denominator as the “target”. *Community College Review*, 37, 136–152.
- Hurtado, S., & Carter, D. F. (1997). Effects of college transition and perceptions of the campus racial climate on Latino students’ sense of belonging. *Sociology of Education*, 70, 324–345.
- Hurtado, S., Han, J. C., Saenz, V. B., Espinosa, L. L., Cabrera, N. L., & Cerna, O. S. (2007). Predicting transition and adjustment to college: Biomedical and behavioral science aspirants’ and minority students’ first year of college. *Research in Higher Education*, 48, 841–887.
- Ignash, J. M., & Kotun, D. (2005). Results of a national study of transfer in occupational/technical degrees: Policies and practices. *Journal of Applied Research in the Community College*, 12, 109–120.
- Ishitani, T. T. (2008). How do transfers survive after “transfer shock”? A longitudinal study of transfer student departure at a four-year institution. *Research in Higher Education*, 49, 403–419.
- Ishitani, T. T., & McKittrick, S. A. (2010). After transfer: The engagement of community college students at a four-year collegiate institution. *Community College Journal of Research and Practice*, 34, 576–594.
- Jain, D., Herrera, A., Bernal, S., & Solorzano, D. (2011). Critical race theory and the transfer function: Introducing a transfer receptive culture. *Community College Journal of Research and Practice*, 35, 252–266.
- Johnson-Benson, B., Geltner, P., & Steinberg, S. K. (2001). Transfer readiness: A case study of former Santa Monica College students. *New Directions for Community Colleges*, 114, 77–85.
- Kadushin, C. (2012). *Understanding social networks: Theories, concepts, and findings*. New York: Oxford University Press.

- Karp, M. M., Hughes, K. L., & O'Gara, L. (2010). An exploration of Tinto's integration framework for community college students. *Journal of College Student Retention: Research, Theory, and Practice*, 12, 69–86.
- Kelly, K. (2009). *Student perceptions of the higher education transfer process from two-year to four-year institutions: A qualitative study viewed through the lenses of student departure, social network, and complexity theories*. Unpublished doctoral dissertation, University of San Francisco, San Francisco.
- Kintzer, F. C. (1973). The community college transfer student. *New Directions for Community Colleges*, 3, 1–14.
- Kisker, C. B. (2007). Creating and sustaining community college—university transfer partnerships. *Community College Review*, 34, 282–301.
- Koker, M., & Hendel, D. D. (2003). Predicting graduation rates for three groups of new advanced-standing cohorts. *Community College Journal of Research and Practice*, 27, 131–146.
- Kozeracki, C. A. (2001). Studying transfer students: Designs and methodological challenges. *New Directions for Community Colleges*, 114, 61–75.
- Kraemer, B. A. (1997). The academic and social integration of Hispanic students into college. *The Review of Higher Education*, 20, 163–179.
- Kuh, G. D. (2001a). Assessing what really matters to student learning: Inside the national survey of student engagement. *Change*, 33, 10–17.
- Kuh, G. D. (2001b). *The National Survey of Student Engagement: Conceptual framework and overview of psychometric properties*. Retrieved from http://nsse.iub.edu/pdf/psychometric_framework_2002.pdf
- Kuh, G. D. (2009). The national survey of student engagement: Conceptual and empirical foundations. *New Directions for Institutional Research*, 141, 5–20.
- Laanan, F. S. (1996). Making the transition: Understanding the adjustment process of community college transfer students. *Community College Review*, 23, 69–84.
- Laanan, F. S. (2001). Transfer student adjustment. *New Directions for Community Colleges*, 114, 5–13.
- Laanan, F. S. (2004). Studying transfer students, part I: Instrument design and implications. *Community College Journal of Research and Practice*, 28, 331–351.
- Laanan, F. S. (2007). Studying transfer students, part II: Dimensions of transfer students' adjustment. *Community College Journal of Research and Practice*, 31, 37–59.
- Laanan, F. S., & Starobin, S. S. (2004). Urban community college transfers to a university. *Academic Exchange Quarterly*, 8, 139–147.
- Laanan, F. S., Starobin, S. S., & Eggleston, L. E. (2010). Adjustment of community college students at a four-year university: Role and relevance of transfer student capital for student retention. *Journal of College Student Retention*, 12, 175–209.
- Layzell, D. T. (1999). Linking performance to funding outcomes at the state level for public institutions of higher education: Past, present, and future. *Research in Higher Education*, 40, 233–246.
- Lee, V. E., & Frank, K. A. (1990). Students' characteristics that facilitate the transfer from two-year to four-year colleges. *Sociology of Education*, 63, 178–193.
- Lee, V. E., Mackie-Lewis, C., & Marks, H. M. (1993). Persistence to the baccalaureate degree for students who transfer from community college. *American Journal of Education*, 102, 80–114.
- Lee, W. Y. (2001). Toward a more perfect union: Reflecting on trends and issues for enhancing the academic performance of minority transfer students. *New Directions for Community Colleges*, 114, 39–44.
- Long, B. T., & Kurlaender, M. (2009). Do community colleges provide a viable pathway to a baccalaureate degree? *Educational Evaluation and Policy Analysis*, 31, 30–53.
- Matlock, J., & Wade-Golden, K. (2009). *University of Michigan transfer student experience: Perceptions, opinions, and experiences of community college transfer students*. Jack Kent Cooke Community College Transfer Initiative final report. Ann Arbor, MI: The University of Michigan, Office of Academic Multicultural Initiatives.
- McCormick, A. C., Sarraf, S. A., BrckaLorenz, A., & Haywood, A. M. (2009, November 4–7). *Examining the transfer student experience: Interactions with faculty, campus relationships, &*

- overall satisfaction*. Paper presented at the annual meeting of the Association for the Study of Higher Education, Vancouver, BC, Canada.
- McDonough, M. L. (2000). *A case study of the transfer process of a selected group of students from a community college to a four-year teacher education program*. Unpublished doctoral dissertation, University of Maryland, College Park.
- McGrath, D., & Van Buskirk, W. (1999). Cultures of support for at-risk students: The role of social and emotional capital in the educational experiences of women. In K. Shaw, J. Valadez, & R. Rhoads (Eds.), *Community colleges as cultural texts: Qualitative explorations of organizational and student culture* (pp. 15–38). Albany, NY: State University of New York Press.
- McMillan, V. K., & Parke, S. J. (1994). Calculating transfer rates: Examining two national models in Illinois. *Community College Review*, 22, 69–77.
- Melguizo, T. (2009). Are community colleges an alternative path for Hispanic students to attain a bachelor's degree? *Teachers College Record*, 111, 90–123.
- Melguizo, T., & Dowd, A. C. (2009). Baccalaureate success of transfer and rising 4-year college juniors. *Teachers College Record*, 111, 55–89.
- Melguizo, T., Kienzl, G. S., & Alfonso, M. (2011). Comparing the educational attainment of community college transfer students and four-year college rising juniors using propensity score matching methods. *Journal of Higher Education*, 82, 265–291.
- Mullin, C. M. (2012). *Why access matters: The community college student body* (Policy Brief 2012-01PBL). Washington, DC: American Association of Community Colleges. Retrieved from http://www.aacc.nche.edu/Publications/Briefs/Documents/PB_AccessMatters.pdf
- National Center for Public Policy and Higher Education. (2008). *Measuring up 2008: The national report card on higher education*. San Jose, CA: National Center for Public Policy and Higher Education. Retrieved from <http://measuringup2008.highereducation.org/print/NCPPEMUNationalRpt.pdf>
- National Center for Public Policy and Higher Education. (2011). *Affordability and transfer: Critical to increasing baccalaureate degree completion*. San Jose, CA: National Center for Public Policy and Higher Education. Retrieved from http://www.highereducation.org/reports/pa_at/PolicyAlert_06-2011.pdf
- Nora, A. (1987). Determinants of retention among Chicano college students: A structural model. *Research in Higher Education*, 26, 31–58.
- Nora, A. (2003). Access to higher education for Hispanic students: Real or illusory? In J. Castellanos & L. Jones (Eds.), *The majority in the minority: Expanding representation of Latino/a faculty, administration and students in higher education* (pp. 47–67). Sterling, VA: Stylus.
- Nora, A., Barlow, E., & Crisp, G. (2005). Student persistence and degree attainment beyond the first year in college: The need for research. In A. Seidman (Ed.), *College student retention: Formula for student success* (pp. 129–154). Westport, CT: Praeger.
- Nora, A., & Cabrera, A. F. (1996). The role of perceptions of prejudice and discrimination on the adjustment of minority students to college. *Journal of Higher Education*, 67, 119–148.
- Nora, A., Cabrera, A. F., Hagedorn, L. S., & Pascarella, E. (1996). Differential impacts of academic and social experiences on college-related behavioral outcomes across different ethnic and gender groups of four-year institutions. *Research in Higher Education*, 37, 427–451.
- Nora, A., & Wedham, E. (1991, April 3–7). *Off-campus experiences: The pull factors affecting freshman-year attrition on a commuter campus*. Paper presented at the annual meeting of the American Educational Research Association, Chicago.
- Núñez, A. (2008). Modeling the effects of diversity experiences and the multiple capitals on Latina/o college students' academic self-confidence. *Journal of Hispanic Higher Education*, 8, 179–196.
- Oberg, K. (1960). Culture shock: Adjustment to new cultural environments. *Practical Anthropology*, 7, 177–182.
- Owens, K. R. (2010). Community college transfer students' adjustment to a four-year institution: A qualitative analysis. *Journal of The First-Year Experience & Students in Transition*, 22, 87–128.
- Pace, C. R. (1980). Measuring the quality of student effort. *Current Issues in Higher Education*, 2, 10–16.

- Pace, C. R. (1984). *Measuring the quality of college student experiences: An account of the development and use of the College Student Experience Survey*. Los Angeles: Higher Education Research Institute, University of California. Retrieved from National Institute for Learning Outcomes Assessment website: <http://www.learningoutcomeassessment.org/surveys.htm#CSEQ>
- Pascarella, E. T., Smart, J. C., & Ethington, C. A. (1986). Long-term persistence of two-year college students. *Research in Higher Education*, 24, 47–71.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research* (2nd ed.). San Francisco: Jossey-Bass.
- Pennington, R. (2006). Rethinking grade transfer shock: Examining its importance in the community college transfer process. *Journal of Applied Research in the Community College*, 14, 19–33.
- Phlegar, A. G., Andrew, L. D., & McLaughlin, G. W. (1981). Explaining the academic performance of community college students who transfer to a senior institution. *Research in Higher Education*, 15, 99–108.
- Piland, W. E. (1995). Community college transfer students who earn bachelor's degrees. *Community College Review*, 23, 35–44.
- Putnam, R. D. (1995). America's declining social capital. *Journal of Democracy*, 6, 65–78.
- Putnam, R. D. (2001). *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.
- Quanty, M. B., Dixon, R. W., & Ridley, D. R. (1999). The course-based model of transfer success: An action-oriented research paradigm. *Community College Journal of Research and Practice*, 23, 457–466.
- Rendón, L. I., Jalomo, R. E., & Nora, A. (2000). Theoretical considerations in the study of minority student retention. In J. Braxton (Ed.), *Rethinking the departure puzzle: New theory and research on college student retention* (pp. 127–156). Nashville, TN: Vanderbilt University Press.
- Reyes, M. (2011). Unique challenges for women of color in STEM transferring from community colleges to universities. *Harvard Educational Review*, 81, 241–262.
- Reynolds, C. L., & DesJardins, S. (2009). The use of matching methods in higher education research: Answering whether attending at a 2-year institution results in differences in educational attainment. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 24, pp. 47–97). Dordrecht, The Netherlands: Springer.
- Rhine, T. J., Milligan, D. M., & Nelson, L. R. (2000). Alleviating transfer shock: Creating an environment for more successful transfer students. *Community College Journal of Research and Practice*, 24, 443–453.
- Rhoads, R. A., & Valadez, J. R. (1996). *Democracy, multiculturalism, and the community college: A critical perspective*. New York: Garland Publishing.
- Roksa, J. (2006). Does the vocational focus of community colleges hinder students' educational attainment? *Review of Higher Education*, 29, 499–526.
- Roksa, J., & Calcagno, J. C. (2010). Catching up in community colleges: Academic preparation and transfer to four-year institutions. *Teachers College Record*, 112, 260–288.
- Roksa, J., & Keith, B. (2008). Credits, time, and attainment: Articulation policies and success after transfer. *Educational Evaluation and Policy Analysis*, 30, 236–254.
- Ruiz, A., & Pryor, J. H. (2011). Assessing the climate for transfer at two- and four-year institutions. *College & University*, 87, 2–6.
- Sandy, J., Gonzalez, A., & Hilmer, M. J. (2006). Alternative paths to college completion: Effect of attending a 2-year school on the probability of completing a 4-year degree. *Economics of Education Review*, 25, 463–471.
- Shaw, K. M., & London, H. B. (2001). Culture and ideology in keeping transfer commitment: Three community colleges. *The Review of Higher Education*, 25, 91–114.
- Spady, W. G. (1970). Dropouts from higher education: An interdisciplinary review and synthesis. *Interchange*, 1, 64–85.
- St. John, E. P., Hu, S., & Fisher, A. S. (2011). *Breaking through the access barrier: How academic capital formation can improve policy in higher education*. New York: Routledge.

- Surette, B. J. (2001). Transfer from two-year to four-year college: An analysis of gender differences. *Economics of Education Review*, 20, 151–163.
- Sylvia, C. L., Song, C., & Waters, T. (2010). Challenges in calculating two-year college student transfer rates to four-year colleges. *Community College Journal of Research and Practice*, 34, 561–575.
- Thurmond, K. C. (2007). *Transfer shock: Why is a term forty years old still relevant?* Retrieved from NACADA Clearinghouse of Academic Advising Resources website: <http://www.nacada.ksu.edu/Clearinghouse/AdvisingIssues/Transfer-Shock.htm>
- Tierney, W. G. (1992). *Official encouragement, institutional discouragement: Minorities in academe—the Native American experience*. Norwood, NJ: Ablex.
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research*, 45, 89–125.
- Tinto, V. (1987). *Leaving college: Rethinking the causes and cures of student attrition*. Chicago: University of Chicago Press.
- Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago: University of Chicago Press.
- Tinto, V. (1997). Classrooms as communities: Exploring the educational character of student persistence. *Journal of Higher Education*, 68, 599–623.
- Townsend, B. K. (1995). Community college transfer students: A case study of survival. *The Review of Higher Education*, 18, 175–193.
- Townsend, B. K. (2002). Transfer rates: A problematic criterion for measuring the community college. *New Directions for Community Colleges*, 117, 13–23.
- Townsend, B. K. (2007). Interpreting the influence of community college attendance upon baccalaureate attainment. *Community College Review*, 35, 128–136.
- Townsend, B. K. (2008). “Feeling like a freshman again”: The transfer student transition. *New Directions for Higher Education*, 144, 69–77.
- Townsend, B. K., & Barnes, T. (2001). Tying transfer to type of associate degree: A tangled knot. *Journal of Applied Research in the Community College*, 8, 125–133.
- Townsend, B. K., McNerny, N., & Arnold, A. (1993). Will this community college transfer student succeed? Factors affecting transfer student performance. *Community College Journal of Research and Practice*, 17, 433–443.
- Townsend, B. K., & Wilson, K. B. (2006a). The transfer mission: Tried and true, but troubled? *New Directions for Community Colleges*, 136, 33–41.
- Townsend, B. K., & Wilson, K. B. (2006b). “A hand hold for a little bit”: Factors facilitating the success of community college transfer students to a large research university. *Journal of College Student Development*, 47, 439–456.
- Townsend, B. K., & Wilson, K. B. (2009). The academic and social integration of persisting community college transfer students. *Journal of College Student Retention*, 10, 405–423.
- Trujillo, A., & Diaz, E. (1999). “Be a name, not a number”: The role of cultural and social capital in the transfer process. In K. Shaw, J. Valadez, & R. Rhoads (Eds.), *Community colleges as cultural texts: Qualitative explorations of organizational and student culture* (pp. 125–151). Albany, NY: State University of New York Press.
- Turner, C. S. V. (1992). It takes two to transfer: Relational networks and educational outcomes. *Community College Review*, 19, 27–33.
- Vaala, L. D. (1991). Making the transition: Influences on transfer students. *NASPA Journal*, 28, 305–311.
- Valadez, J. (1993). Cultural capital and its impact on the aspirations of nontraditional community college students. *Community College Review*, 21, 30–43.
- Valadez, J. (1999). Preparing for work in a postindustrial world: Resistance and compliance to the ideological messages of a community college. In K. Shaw, J. Valadez, & R. Rhoads (Eds.), *Community colleges as cultural texts: Qualitative explorations of organizational and student culture* (pp. 83–102). Albany, NY: State University of New York Press.
- Varlotta, L. (2010). Enrollment management in the CSU: Right-sizing to align with state allocations. *Enrollment Management Journal*, 4, 116–136.

- Volkwein, J. F., King, M. C., & Terenzini, P. T. (1986). Student-faculty relationships and intellectual growth among transfer students. *Journal of Higher Education*, 57, 413–430.
- Wang, X. (2009). Baccalaureate attainment and college persistence of community college transfer students at four-year institutions. *Research in Higher Education*, 50, 570–588.
- Ward, C., & Kennedy, A. (1993). Where's the "culture" in cross-cultural transition?: Comparative studies of sojourner adjustment. *Journal of Cross-Cultural Psychology*, 2, 221–249.
- Wassmer, R., Moore, C., & Shulock, N. (2004). Effect of racial/ethnic composition on transfer rates in community colleges: Implications for policy and practice. *Research in Higher Education*, 45, 651–672.
- Wolf-Wendel, L., Twombly, S., Morpew, C., & Sopcich, J. (2004). From the barrio to the bucolic: The student transfer experience from HSIs to Smith College. *Community College Journal of Research and Practice*, 28, 213–231.
- Wolf-Wendel, L., Ward, K., & Kinzie, J. (2009). A tangled web of terms: The overlap and unique contribution of involvement, engagement, and integration to understanding college student success. *Journal of College Student Development*, 50, 407–428.
- Zamani, E. M. (2001). Institutional responses to barriers to the transfer process. *New Directions for Community Colleges*, 114, 15–24.
- Zarkesh, M., & Beas, A. M. (2004). UCLA community college review: Performance indicators and performance-based funding in community colleges. *Community College Review*, 31, 62–76.

Chapter 11

Public Policy and Higher Education Attainment in a Twenty-First-Century Racial Demography: Examining Research from Early Childhood to the Labor Market

Stella M. Flores and Leticia Oseguera

Introduction

After decades of attention to improving college access, attention has now turned to college completion. Consideration of college completion rates presents a stunning picture of stagnation, putting a damper on the appearance of progress and again raising questions about the factors that are operating to limit progress along the larger educational pipeline (Turner, 2004). Whereas college enrollment rates have increased over the past 20 years, college completion rates have generally not. Some groups did manage to experience a slow but steady increase in college completion rates, while others, such as Hispanics, actually experienced declining completion rates (Kurlaender & Flores, 2005). On average, low-income and underrepresented minority groups, defined here as students who are Black, Latino, and Native American, continue to exhibit even lower rates of completion than the overall US population (Kurlaender & Felts, 2008). Moreover, the USA has failed to improve college completion rates during a period of time when college degree completion has increasingly become the necessary condition for entry into the middle class and other similarly industrialized countries have experienced substantial improvements in college completion, potentially compromising the US global competitiveness (Lewin, 2010).

S.M. Flores, Ed.D. (✉)

Department of Leadership, Policy, and Organizations, Vanderbilt University,
414 GPC, 230 Appleton Place, Nashville,
TN 37203-5721, USA
e-mail: stella.m.flores@vanderbilt.edu

L. Oseguera, Ph.D.

Department of Education Policy Studies and The Center for the Study
of Higher Education, The Pennsylvania State University, 400 Rackley Building,
University Park, PA 16802-3203, USA
e-mail: oseguera@psu.edu

Why does the United States have such poor college completion rates? Has US educational policy moved beyond questions of college access to those of completion? Should these two markers of educational achievement be considered together or separately? How do other parts of the US educational pipeline, such as the early childhood education to kindergarten sector, the middle school sector, and the high school sector, contribute to the larger goals of college access and completion? A more holistic view of who stays in and who exits the educational pipeline before college completion indicates that the problems preventing completion begin well before college entry.

By the mid-2000s, social science research in various disciplines as well as policy analysts from legislative arenas argued that, to address the problem of college access and completion for low-income and underrepresented students in the USA, a K-16 approach would be more comprehensive and better suited to identifying effective strategies (Gándara, 2002; Louie, 2007; Trent, Orr, Ranis, & Holdaway, 2007). Louie, for example, documents a growing research consensus calling for an integrative model that bridges the gap in research, policy, and practice between K-12 schooling and higher education—in other words, a K-16 perspective. The essays make recommendations for state policymakers to establish stronger legislative links between K-12 and higher education, for universities and community organizations to create additional partnerships, and for researchers to stretch their disciplinary and organizational boundaries by adopting a K-16 perspective. In this chapter, we use a conceptual approach that builds on this third recommendation with one key alteration. We extend the K-16 pipeline to include early childhood initiatives that have been found to have an effect on long-term educational outcomes such as high school completion, college enrollment, and college completion.

The P-16 framework we apply to understanding the educational pipeline in this review includes numerous interventions that have been suggested to affect the immediate, intermediate, and long-term outcomes associated with college success. For example, consideration of the barriers that limit high school completion particularly for very low-income individuals, English language learners, and many males of color, suggests that high school completion is a critical step in the college access and completion process (Callahan, Wilkinson, & Muehler, 2010; Saenz & Ponjuan, 2009; Tyler & Lofstrom, 2009). We therefore argue that, while the research on college access and completion places the postsecondary institution at the center of such interventions, these institutions are by no means the only actors in the solutions required to help those currently least likely to earn a college degree to reach this goal. The American high school, with its crucial relationship to the pre-K-8 sector and the college-related activities that can occur during high school (such as enrolling in rigorous course work and the college application process), is clearly a key actor in the P-16 pipeline. In this chapter, we offer an expanded view of the various segments of the US educational pipeline, from early childhood to college completion. Within each segment, we identify policies and programming designed to improve postsecondary outcomes and ultimately lead to college completion. That is, we discuss specific policies and practices related to the college access and completion of low-income and minority students and share insights into how we know

from available theory and research whether such practices work as well as what remains to be learned about these particular potential solutions.

We engage the research in this chapter in the following manner. Education research varies in method and purpose and draws on multiple disciplinary perspectives. The research on postsecondary access and completion reviewed in this chapter is by no means exhaustive; we review research from education, economics, sociology, and public policy, limiting the discussion to studies that directly and indirectly examine policies that affect postsecondary performance. Chapters in previous editions of this handbook also offer excellent strategies for understanding the role of methods when assessing particularly complex issues, such as financial aid (Cheng, 2008; DesJardins, 2003; Goldrick-Rab, Harris, & Trostel, 2009). We refer the reader to this work for an additional methodological review.

Roadmap

We begin with a demographic portrait that utilizes geographic information system (GIS) methods to describe two key outcomes of interest—completion of a high school diploma and completion of a baccalaureate degree. Using a P-16 pipeline framework, we then provide an assessment of research from the early childhood education/kindergarten sector to the high school level, with a particular focus on policies and programs that are designed to influence high school graduation, college access, and college completion outcomes. We next examine the postsecondary institution sector of the P-16 pipeline, which we categorize as a dichotomy between the “elite” and the “access” institutions, noting the important debates that translated into policy and programmatic interventions within the most selective US colleges and the community college sector. We end with recommendations for areas of future research.

The Demography of Educational Attainment

Sociologists interested in schools and educational attainment have long incorporated demographic indicators into analyses of educational attainment, even if demographers, who apply particular methods in the study of population processes, have not always engaged with education variables in a similar manner (Marlani, 2009). Nonetheless, educational attainment—and, for the purposes of this chapter, high school completion, college enrollment, and college completion—is closely associated with the demographic characteristics of the individuals who achieve or do not achieve these educational milestones. For example, research reveals that not attaining a high school diploma has costs for both the individual and society. Tyler and Lofstrom (2009) note that not addressing the dismal rate of failure in obtaining a high school diploma has significant social implications, such as low tax revenues,

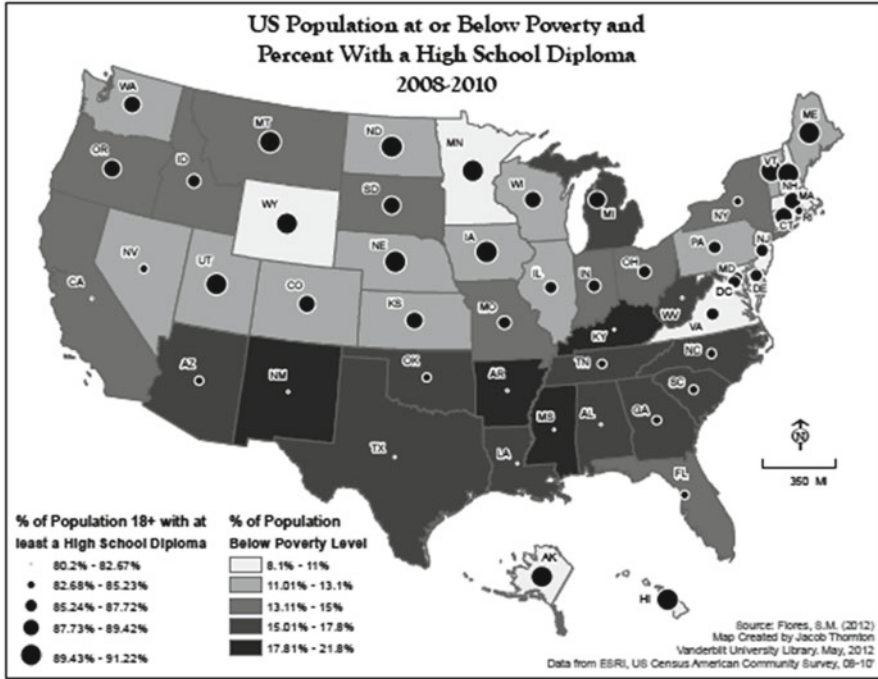


Fig. 11.1 US population at or below poverty and percent with a high school diploma 2008–2010

increased spending on health and entitlement programs, and higher crime rates. Because low-income students and racial minorities such as African Americans and Latinos are more likely to drop out of high school than White students, the individual costs of dropping out of school fall more heavily on the economically and educationally disadvantaged. Earning a postsecondary credential also has documented individual and social benefits. At the individual level, as has been well established, educational attainment leads to higher earnings (Card, 1999). Moreover, a community whose population has a higher rate of college graduates and even high school graduates is associated with higher wages for other individuals in that community (Moretti, 2004).

Using GIS techniques, Figs. 11.1 and 11.2 illustrate the relationship between the completion of educational credentials and such demographic indicators as race/ethnicity and poverty. Using data from the American Community Survey for 2008–2010, Fig. 11.1 displays the percentages of individuals over age 18 who have earned a high school diploma in each state. We present these figures using black dots with a white outline; the percentage of the population that lives below the federal poverty level is represented for each state by the shades that range from white to gray to black. Wyoming, for example, has the lowest percentage of individuals age 18 and over living in poverty, which is presented in white, whereas New Mexico and Kentucky, which have some of the highest percentages of individuals age 18 and

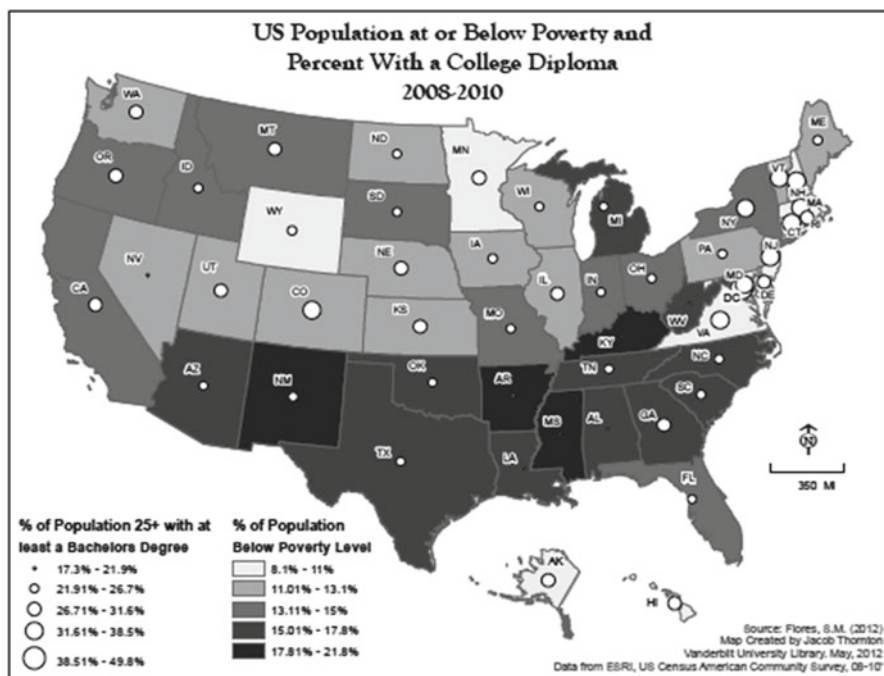


Fig. 11.2 US population at or below poverty and percent with a college diploma 2008–2010

over living in poverty, are presented in gray. The data show that a number of southern states have the highest percentage of the population living in poverty, including Arkansas, Kentucky, and Mississippi. States with the next highest percentage of those living in poverty are Texas, Arizona, and the rest of the southern states. The percentage of individuals age 18 and over in each state who have earned a high school diploma suggests the relationship between poverty and educational attainment. The four states with the highest percentage of individuals age 18–24 who have at least a high school diploma are Wyoming (91.2%), Minnesota (90.9%), Vermont (90.8%), and New Hampshire (90.7%); these are states with low poverty rates. Conversely, the states with the lowest percentage of high school graduates age 18–24 include states with the highest rates of poverty, most notably Texas (80.2%), Mississippi (80.3%), and Louisiana (86.6%). The states with the lowest percentage of high school graduates also have either large African American populations (Mississippi and Louisiana) or large immigrant and Hispanic populations (Texas and California).

Similarly, Fig. 11.2 presents American Community Survey data related to the percentage of individuals over age 25 in each state who have completed a bachelor's degree, also for the years 2008–2010, relative to the percentage of individuals in each state who live below the poverty line. While the states with the highest poverty level remain the same as in Fig. 11.1 (the darker the shade of gray, the higher the

percentage of poverty), the states at the top and bottom of the bachelor's degree completion distribution vary from those at the top and bottom of the high school completion distribution. That is, the states with the highest percentages of high school degree completion are not necessarily the states with the highest percentages of bachelor's degree completers. The states with the highest percentages of individuals over age 25 who have completed a bachelor's degree are Massachusetts (38.5%), Colorado (36.2%), Connecticut and Maryland (35.6%), and New York (34.9%). States at the bottom of the distribution for earning a bachelor's degree are West Virginia (17.3%), Arkansas (19.0%), Mississippi (19.6%), and Kentucky (20.5%). While the focus of this review is not necessarily state policy, we present the educational condition of states to provide a context for the programs and interventions we examine. These illustrations may also be interpreted in the context of the research described earlier about the relationship between degree attainment and crime as well as increased earnings for communities (Moretti, 2004; Tyler & Lofstrom, 2009). We now turn to the policy research on key milestones in the pre-K-16 pipeline—early childhood, middle school, high school, and college entry.

Early Childhood: Precollege Predictors of College Access and Completion

Economists, developmental psychologists, and education researchers have documented the impact early childhood education has on the college attainment of those who participate in such programs (Deming, 2009; Duncan, Ludwig, & Magnuson, 2007; Garces, Thomas, & Currie, 2002; Lee & Burkam, 2002; Ludwig & Miller, 2007). Additional research from neuroscience also suggests that early learning experiences, including early education programs, encourage brain development that has lifelong implications on the ability to learn (Nelson, 2000; Shonkoff & Phillips, 2000). Thus, in this section, we examine early childhood/early education programs associated with two milestones that lead to college completion, high school graduation, and college entry, as well as college completion itself. We also discuss current research on early childhood programs and argue that understanding students' early childhood education experiences is important in ensuring their long-term educational success. The studies we examine utilized experimental designs with the goal of establishing the causal impact of early childhood education on young adult educational outcomes.

Preschool and College Completion

The Perry Preschool intervention was a randomized experiment that provided half-day home and educational services to low-income, low-IQ African American children in Ypsilanti, Michigan, in the 1960s. All Perry Preschool teachers had at

least a bachelor's degree. Children were randomly assigned to participate in this preschool intervention, which included 1–2 years of services. The Abecedarian program, which began in 1972, served low-income African American women in Chapel Hill, North Carolina. The program participants, who were randomly selected, received year-round child care, health care, and other social services for the first 5 years of their children's life. Beginning as infants, the children of the selected participants were provided with transportation to and from the program site, and they received individualized educational activities in a classroom setting with low teacher-child ratios.

Researchers found that the Perry program had long-term effects on program participants' high school completion rates—66% of the Perry participants compared with only 45% of the control group graduated high school—but there was no effect of the program on participation in postsecondary education (Schweinhart et al., 2005). In contrast, the long-term effects of the Abecedarian intervention for the children of participants included college entry rates 2.5 times higher than those of the control group: 36% of Abecedarian participants went on to pursue postsecondary education, while 13% of the control group did so (Barnett & Masse, 2007; Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002).

While these studies concluded that these early childhood education programs had promising effects on the long-term educational success of program participants, a reanalysis of the data suggests that the program effects of the two interventions may have been overstated (Anderson, 2008). Anderson reexamined the studies, applying a *de novo* design to correct for the problem of multiple inferences. After reducing the number of hypotheses tested and combining multiple outcomes into a summary index across the preteen, adolescent, and adult life stages, Anderson concluded that earlier studies overstated the programs' effects on low-income male students. While both programs boasted improved high school graduation rates, Anderson's reanalysis suggested that this was due to improvements in female program participants' graduation rate, not males. Anderson also concluded that the improved college rates for the Abecedarian participants were also due primarily to females' higher likelihood of entering college.

The program effects for males related primarily to reducing antisocial behaviors, such as criminal activity and drug use, but even these effects were weak and inconsistent. Anderson's study did confirm a positive effect of participating in the Perry program on monthly earnings for male participants. Nonetheless, he concluded that "the indicated treatment effect heterogeneity calls into question the external applicability of these experiments ... If treatment effects vary by gender, then they likely also vary by race or class" (p. 1494). Such work highlights the possibility that educational interventions may indeed affect social groups differentially and signals that policy formulations should take these differences into account.

Despite mixed evidence on the effects of participation in the Perry or Abecedarian programs on high school completion and college enrollment, researchers have found that other early childhood education initiatives (e.g., Head Start) increased high school completion rates and college attendance rates for participating students (Garces et al., 2002; Ludwig & Miller, 2007). Using a nationally representative

sample of children who participated in Head Start programs, which was acquired from a one-time supplemental survey to the Panel Study of Income Dynamics of all adult household members from a representative sample of households, and comparing the differences in educational outcomes between siblings who did and did not participate in Head Start programs, Garces et al. found that non-Hispanic White children who participated were more likely than their siblings enrolled in other types of preschool or no preschool to (1) complete high school (by about 22 percentage points) and (2) to attend college (by about 19 percentage points). Among African Americans, the high school and college enrollment effects were small and not significant, respectively.

Ludwig and Miller (2007) used data from the National Education Longitudinal Study and US Census county-level income measures and examined the 300 poorest counties in the country, and while they did not report actual high school completion rates for study participants, they did conclude that participation in Head Start increased the level of schooling attained by one-half year and increased the likelihood of attending college by 15%. These positive effects of program participation were identified for both the Black and non-Hispanic White samples and are comparable to the results identified by Garces et al. (2002).

Using another dataset with a more recent cohort of Head Start participants, the National Longitudinal Survey of Youth 1979 (NLSY) and the National Longitudinal Mother-Child Supplement, which surveyed mothers of NLSY participants every 2 years from 1986 to 2004, Deming (2009) also identified long-term effects for people who participated in Head Start from 1984 to 1990. Confirming the positive effects of participation in Head Start on long-term educational outcomes, Deming found that Head Start participants were 8.5% age points more likely to graduate from high school and 6 percentage points more likely to have attended 1 year of college than non-Head Start participants. The higher graduation rates were driven largely by females and students who were children of mothers with low Armed Forces Qualification Test (AFQT) scores. Gains in high school completion and college enrollment were also greater for African American students than White students in this sample. Head Start participants whose mothers had high AFQT scores were more likely to attend college than Head Start participants whose mothers had low AFQT scores. Using a six-item index of adult outcomes (representing high school graduation, college attendance, idleness, crime, teen parenthood, and health status), Deming identified significantly greater scores for Head Start participants than for those who did not attend preschool; the .228 standard deviation difference translates into about 75% of the Black-White outcome gap in the sample. Much of the test-score improvement shown among Head Start participants was driven by gains in male test scores—a finding that challenged earlier researchers who had found that early childhood interventions primarily advantage girls (Anderson, 2008; Deming, 2009).

In short, the available research evidence on the effect of early childhood education programs on high school completion and college enrollment is generally positive, although the magnitude of the effects varies by social identity groups and to some extent by the time period when the cohorts were preschool age.

Class Size Reduction and College Completion

The final study reviewed in this section is one of the first to evaluate the effects of early education interventions such as class size reductions on college progress and college completion. Dynarski, Hyman, and Schanzenbach (2011) utilized data from the Tennessee Student/Teacher Achievement Ratio (STAR) randomized experiment and college data from the National Student Clearinghouse on former STAR students who were 12 years out of high school, presuming an on-time 1998 high school graduation (see full paper for a discussion of the appropriateness of using National Student Clearinghouse data to capture rates of college attendance). They found that assignment to a small class via participation in the STAR experiment increased the likelihood of students attending college, completing more semesters of college, and finishing college over non-STAR participants. The authors also split the sample into quintiles, based on the propensity to enroll in college, and found the largest effect of STAR was on the college enrollment of students with the lowest propensity to enroll. Students who experienced STAR also had a greater likelihood of enrolling in college on time and remaining enrolled in college than non-STAR participants, regardless of enrollment propensity. Dynarski et al. found that the treatment group spent .22 more semesters in college than the control group and that this effect was substantially greater for students with the lowest expected probability of attending college. College completion and the age at degree completion also increased by 1.6 percentage points for the treatment group. That is, through their late twenties, students assigned to small classes during childhood because of STAR secured college degree at higher rates than their peers.

Like other research reviewed in this section, Dynarski et al. (2011) examined the heterogeneity of effects by racial group, gender, and class and found that the treatment effect was largest for groups with the lowest average levels of college success. In other words, small class size had more than five times the effect on the college success of Black students than White students, twice the effect on college success for boys than girls, and a larger effect for children eligible for free or reduced-price lunch than for ineligible children. While the greater positive effect on the college participation of Black students and economically disadvantaged students confirms past researchers' findings (Garces et al., 2002; Ludwig & Miller, 2007), the greater positive effect of program participation on college success for boys than girls extends Deming's (2009) conclusion that early childhood education programs do not only benefit female participants.

In summary, this section demonstrates the importance of educational interventions in the early stages of the education pipeline for the academic progress and ultimate educational attainment of diverse student groups, including boys, a group that has recently experienced substantially lower achievement in the pre-K-16 sector than girls (Conchas & Vigil, 2012; Saenz & Ponjuan, 2009).

The studies reviewed in this section include both older and more recent cohorts of participants in early childhood education initiatives. The studies use experimental designs of small-scale early education programs, as well as matched comparisons of

large-scale federal early education interventions. While the research summarized here made various attempts to control for measures of respondents' family background, neighborhood, and living environments, there were limitations of these studies that potential future research might remedy. For example, it would be helpful to understand why parents enrolled some of their children and not others in a pre-school program such as Head Start, whether the program benefits for the participating siblings had spillover effects on the college-related outcomes of nonparticipating siblings, and what the added effect of spillover on these similar college-related outcomes could be. Future national and state studies of early educational intervention programs also should include a more representative sample of today's youth. Hispanic students, for example, outnumber all other racial and ethnic groups in Texas, a trend that a number of other states will soon experience (Unmuth, 2011). With this demographic group in mind, issues such as language and immigrant status need to be accounted for appropriately in order for teachers, administrators, and research groups to analyze this growing group of children. In sum, the analysis required to assess the effects of these programs on students' college-related outcomes has become more complex with the changing demographics. Finally, the early childhood education programs now available are more diverse (e.g., they are run by private companies and are state-funded programs), and research has not sufficiently established whether the effects on educational outcomes depend on the particular program a student accesses.

Middle School Experiences: The Long-Term Impact of Math Achievement

Research has clearly established that completion of algebra and more advanced math courses is critical to continued academic achievement (Adelman, 1999, 2006). Students who do not complete algebra are less likely to enroll in college (Adelman, 1999, 2006; Oakes, 2003). Suggesting growing awareness of this research finding, 29% of all 13-year-olds (i.e., eighth graders) were enrolled in algebra in 2004, up from 22% in 1999 and 16% in 1986 (Perie, Moran, & Lutkus, 2005).

Research also shows a positive relationship between mathematics coursework and other college-related outcomes. Spielhagen (2006a) used system-level data for a large school district to show that, controlling for ability, students who took algebra in the eighth grade scored higher on the SAT I and were more likely to attend college than their peers who did not take algebra or remain on a mathematics pathway throughout high school. Using the same dataset, Spielhagen (2006b) also showed that the level of eighth-grade achievement in algebra is not predicated on seventh-grade mathematics scores—thus suggesting that mathematics gains are achievable over short periods of time, given access to strong math instruction. These findings are consistent with national studies (e.g., Gamoran & Hannigan, 2000; Stein, Kaufman, Sherman, & Hillen, 2011) that indicate that all students show gains in achievement after taking algebra.

Nonetheless, participation in high levels of mathematics varies across demographic groups. Using data from the Early Childhood Longitudinal Study-Kindergarten Cohort, Walston and McCarroll (2010) showed that algebra coursework in the eighth grade is primarily accessed by Asian, White, and high-SES students, as well as private school students. Students enrolled in advanced mathematics courses through the end of high school continue to be disproportionately Asian or White and from high-SES homes (Bozick & Ingels, 2008). Walston and McCarroll also found regional differences, with the West and the Northeast having higher percentages of students taking algebra than the Midwest and South. Data from the Early Childhood Longitudinal Study-Kindergarten Cohort also show that higher proportions of students from low-income families do not have advanced mathematics classes available in their school, even if parents and students report knowing that completing advanced mathematics coursework is important for later educational success. Walston and McCarroll also found that, while high math test scores in the fifth grade predicted algebra enrollment in the eighth grade, one-quarter of fifth-grade students with the highest quartile math scores and one-half of those with the second highest math scores did not enroll in algebra by the eighth grade, reminding researchers that high test scores are not a sufficient condition for algebra enrollment.

Gamoran and Hannigan (2000) used data from the National Educational Longitudinal Study of 1988 and found positive effects of algebra on student test scores, albeit small, particularly for students with prior mathematics achievement in the lowest quintile. The authors also considered what might occur if schools were to move entire systems (not just individual students) to algebra and found that “students gain no less from algebra when their schools include more diverse populations of algebra-takers, compared to schools with more homogeneous populations of students taking algebra” (p. 241). In other words, having all students complete algebra, regardless of initial score proficiency, does not have negative effects on a student’s subsequent performance on math tests.

In contrast, Allensworth, Nomi, Montgomery, and Lee (2009) evaluated a Chicago policy that ended remedial classes and mandated college preparatory course work for all students. Using an interrupted time-series cohort design with multiple comparisons, the authors found that the policy reduced inequities in ninth-grade coursework by entering ability and race/ethnicity. However, while more students completed ninth grade with credits in algebra and English I, failure rates in these courses also increased, and the grades earned in these courses declined slightly. Test scores did not improve and students were no more likely to enter college with the college preparatory curriculum mandates.

Finally, using information from three national longitudinal datasets: the ECLS-B (Birth Cohort), the ECLS-K, and the National Education Longitudinal Study of 1998 (NELS:88), Lee (2012) examined the extent to which various math proficiency standards predicted college access and completion behavior. The analyses identified large disparities between actual (e.g., particular standardized score) and desired (e.g., score predictive of outcome) math achievement levels for college access and completion. More specifically, students who entered four-year colleges actually scored at the national average in math, which is equivalent to the level between the

current national standard and state proficiency standards, whereas those students who ultimately graduated college with a bachelor's degree scored *above* the national average in math, which is equivalent to scoring "high" on the TIMSS or "proficient" on the NAEP. Students who completed associate's degrees met the average state's math test proficiency standard, while students who merely entered a two-year college had scores in the bottom quartile of national achievement, a level far below the average state proficiency standard. In short, these analyses demonstrate that the various math proficiency standards that are currently in place do not equate to college enrollment and completion for the students in this sample and do a relatively poor job of forecasting college enrollment (Lee, 2012).

Modeling math achievement trajectories by racial groups and parental education levels, Lee (2012) also found that Asian and White students were on track for completing a four-year college degree as early as elementary school, whereas Latinos were on track for a four-year degree only through the third grade. Black students were behind all other groups—they were never on track for completing a four-year college, and they were on track for completing a two-year college only through elementary school; by middle and high school, Black students' trajectory was toward entering a two-year college. Not surprisingly, students whose parents had college degrees were on track through high school to enter and complete college. Lee defined being "on track" by comparing actual college behavior against test scores students earned during their elementary and middle school years. Using this approach, Lee identified as early as elementary school whether particular student groups were on a trajectory for college enrollment and completion.

While the research presented in this section demonstrates the importance of access to advanced mathematics curriculum, research does not establish how to best serve a classroom of students with diverse mathematical abilities. In a review of algebra coursework, Stein et al. (2011) concluded that, when studies evaluate individual students and their movement to algebra, the achievement results are positive, but in studies that evaluate entire classrooms or systems, the results are mixed likely because researchers are not able to control for differences within classrooms. Nonetheless, in schools with policies mandating strong academic support for struggling students, the overall results are positive (Stein et al., 2011).

The movement of many states to standardize the curriculum raises the question of how best to serve students with varied prior ability. Although Lee's (2012) study demonstrates the utility of generating growth curves at the aggregate national level that simulate the full range of P-12 growth trajectories to examine the links between varying math achievement and college access and completion, one of the shortcomings is that limited inferences can be made when the same student is not followed longitudinally. Lee's study also considers outcomes based on only one math standard even though students enroll in a variety of courses throughout their educational careers. There is no research to support that assessments at different grade levels are comparable across a student's trajectory. Finally, using aggregate data from the sources listed above, Lee could not account for different states policies and standards that could influence the study findings. These limitations underscore the value of databases that span the education pipeline.

High School Experiences

The experiences that students engage in during their critical 4 years of high school can determine the types of opportunities that will be available to them post-high school. This section identifies areas that primarily relate to a student's academic ability and conditions for learning (Achieve, 2012; Center for American Progress, 2009; Center for Education Policy, 2010, 2011). We focus on existing research while also highlighting the research that still needs to be undertaken in order to understand how to ensure student success. We begin with research on standardized testing including high school exit examinations and college admission tests. We also include attention to academic experiences that contribute to performance on these assessment practices including the rigor of the high school experience, whether students graduate from schools that offer opportunities for advanced coursework, and whether students graduate from high school having completed at least a minimum academic curriculum. We selected these particular experiences because they are at the forefront of discussions about how best to prepare students during the high school years to succeed in college and careers.

High School Exit Exams and the Racial Achievement Gap

Although 83% of the nation's students of color and 75% of low-income students reside in states with high school exit exam requirements (Dietz, 2010), there is mixed evidence for the effects of exit exams on student achievement and other educational outcomes. As of the 2010–2011 school year, 25 states required a passing grade on a high school exit exam to earn a high school diploma. Six other states have in place or plan to have a high school exit exam, but do not require a passing grade on the test for students to graduate. Three states, Georgia, North Carolina, and Tennessee, had required a minimum passing score, but now use this score as only one part of the grade in a final course requirement. A high school exit exam can take the form of a minimum competency exam (MCE) (i.e., minimum skill levels), comprehensive exam, or end-of-course exam. By 2015, MCE's will be phased out and high school exit exams will take the form of comprehensive or end-of-course exams with higher standards than minimum skills.

Eleven states require students to take the SAT or ACT college entrance exam, but a minimum score is not required. Sixteen states also offer college or career readiness assessments (nine use ACT assessments, five using PSAT assessments, and two use state developed assessments), and "although many states are using college and career readiness assessments to determine how well students are being prepared for success after high school, very few colleges and universities actually use these assessments for college admission or placement" (CEP, 2011, executive summary). One explanation for this conclusion may be that the current college and career assessments are not aligned with the high school curriculum. This situation may change when the new assessments developed for the common core state standards are developed (CEP).

Available research shows little to no effect of minimum competency exams (MCEs) and test-score gains on student outcomes (Bishop, Mane, Bishop, & Moriarty, 2000; Jacob, 2001). Examining students in the bottom decile for reading, Jacob identified small reading gains for the students in states with MCEs. Also examining students in the bottom quartile of test scores, Reardon, Atteberry, Arshan, and Kurlaender (2009) found no effect of exit exams on student achievement; their analyses also found lower performance on exit exams for Black and Hispanic students than for White students. Reardon and colleagues (2009) and Bishop and colleagues (2000) found no overall effect of MCEs and test-score gains, although Bishop and colleagues did identify small test-score gains for students who had a C grade average, compared to students with A or B grade averages. Although there was no achievement effect for middle- and high-ability students (as might be expected), most studies reviewed also found no effect on those at the bottom level of achievement (see Holme, Richards, Jimerson, & Cohen, 2010, for expanded discussion).

Early research showed some evidence that MCEs are negatively related to educational outcomes for low-achieving students and Black males specifically (Bishop & Mane, 2001a, 2001b; Jacob, 2001). As the rigor of exit exams has increased, some research suggests that exit exam policies contribute to increased dropout rates for low-achieving students and students in high-poverty urban schools (Bishop et al., 2000; Reardon et al., 2009; Warren, Jenkins, & Kulick, 2006). The evidence is mixed, however, as other researchers found no differences or even increased completion with rigorous exit exams (Greene & Winters, 2004; Warren & Jenkins, 2005).

Some of the dropout effect may be due to the psychological effects of high-stakes testing that discourages students from persisting. In a study that compared the high-stakes California high school exit exam with performance on the low-stakes California Standards Test, Reardon and colleagues (2009) found evidence of stereotype threat. That is, racial and ethnic minority students underperformed at higher rates on high-stakes tests than on low-stakes tests compared to their White peers. In addition to their mixed findings on exit exams and high school completion, Reardon and colleagues also concluded that these exams may be depressing the academic performance of racial and ethnic minorities, which subsequently leads to high school dropout.

The available research on the effects of MCEs and more rigorous exit exams on college enrollment also has mixed results. Using nationally representative datasets, Bishop and Mane (2001a, 2001b) reported that MCEs were associated with a slightly increased likelihood of enrolling in college. Bishop et al. (2000) extended the examination to 2 years post-high school and identified that these enrollment effects were stronger for higher-ability students than for lower-ability students. However, using public use microdata samples of over one million students from the American Community Survey, Dee (2003), Dee and Jacob (2006), and Warren, Grodsky, and Lee (2008) each found no evidence that MCEs are associated with increased college enrollment. The only racial and ethnic difference was identified by Dee and Jacob; this study found that MCEs did predict college enrollment among Hispanic females. While the move to more rigorous tests coupled with the

subsequent attainment of a minimum passing score is meant to signal increased college readiness, research shows mixed impact on an average student's likelihood of attending college.

We now move to a review of high school coursework patterns and the relationship to college enrollment, as well as the factors that predict whether a school will offer advanced coursework to its students.

Advanced Placement Access, Curricular Intensity, and College Achievement

Research shows mixed evidence that access to advanced courses is stratified along racial and ethnic lines. As of 2010, only one-third of US public schools offered AP or IB courses in the four core subject areas of English, mathematics, natural sciences, and the social sciences (College Board, 2011). Using data from North Carolina public schools, Darity, Castellino, Tyson, Cobb, and McMillen (2001) found that racial and ethnic minorities had more access to AP courses than White students but that this was largely due to the fact that the White population in North Carolina tends to be concentrated in small, rural schools throughout the state. Using data from the Texas Schools Microdata Panel, Klopfenstein (2004a) examined how the expansion of the AP program across the nation impacted racial and ethnic minorities' access to AP curriculum. The Texas data used by Klopfenstein are particularly advantageous in examining racial and ethnic minorities, given the state's diverse population. Klopfenstein found that, while government incentive programs did increase AP course availability in Texas schools, access to these courses by racial and ethnic minorities did not increase. That is, racial and ethnic minority students' likelihood of enrolling in an AP course did not increase despite the increased course availability. Using nationally representative data from the NELS, Attewell and Domina (2008) also found racial differences in accessing advanced coursework with Asian and White students accessing advanced curricula at greater rates than Hispanic and Latino students, even within the same schools.

Like other researchers (Adelman, 2006; Perkins, Kleiner, Roey, Brown, 2004), Attewell and Domina (2008) found small to medium differences between racial and ethnic groups in curricular intensity, and medium differences in curricular intensity based on socioeconomic status (SES). White high school students were more likely to be enrolled in curricular intense courses than their racial and ethnic counterparts; higher-SES students were more likely to be enrolled in more curricular intense courses than low-SES students. However, controlling for prior academic performance eliminated differences in curricular intensity by racial and ethnic group, with Black students even more likely than White students to enroll in an intense course curriculum. The authors also found that, although prior academic achievement was a strong predictor of academic intensity, differences in curricular intensity based on SES persisted after controlling for prior academic performance. They also showed that curricular differences based on SES and race and ethnicity reflect differences

within schools rather than between schools; within the same school, racial and ethnic minorities and low-SES students enrolled in more intense curricular tracks at lower rates than their White and higher-SES peers who attend the same school. This finding is consistent with earlier research on curricular tracking (Lucas & Berends, 2002; Oakes, 2005; Oakes & Guiton, 1995).

Using data from the National Educational Longitudinal Study (NELS) and the High School and Beyond survey (HS&B), scholars have observed a positive relationship between students' curricular intensity in high school and their movement through college (Adelman, 1999, 2006; Horn, Kojaku, & Carroll, 2001). Organizing students into different curricular intensity levels from the most demanding to least demanding curriculum, Attewell and Domina (2008) found positive effects of intensity on academic outcomes, but these effects are not consistent across levels of intensity. They found smaller effects of intensity on college enrollment and completion for students at the highest levels of curricular intensity, with greater differences among students from lower-intensity quintiles.

One marker of curricular intensity is enrollment in the Advanced Placement curriculum. Using data from students enrolled in the University of California system, Geiser and Santelices (2004) found that students who completed AP courses had comparable college achievement as students who had enrolled in a standard college preparatory curriculum. In contrast, using a sample of 3,781 AP and/or dual-enrollment students and 2,760 non-AP and non-dual-enrollment students, McCauley (2007) found that enrollment in AP courses or dual-enrollment programs (i.e., programs that allow students to earn college credit while in high school) was positively related to college completion. While the Geiser and Santelices study did not find unique effects of AP coursework and college achievement as the McCauley study did, both studies noted that all students in the sample had fulfilled a rigorous academic curriculum in order to gain admission to the university and, therefore, that the findings establish the importance of a high level of academic rigor during high school.

Since one of the main conclusions of available research is the importance of academic coursework (Attewell & Domina, 2008; McCauley, 2007), in this review we also include the results of studies conducted by scholars who aim to establish which course sequences in high school result in the successful completion of college-level courses. Using a subset of high school graduate ACT test-takers in 2003 who had taken the PLAN (i.e., four curriculum-based assessments in English, math, reading, and science) as sophomores and the ACT as juniors or seniors, and controlling for prior academic achievement, ACT (2005) identified course sequences in math, science, and English that translated into greater achievement gains and success in college courses, as measured by passing the college-level course in those respective subject areas. ACT also identified cross-disciplinary course benefits. For example, successful completion of college English composition was associated with having completed at least 1 year of foreign language study in high school. Completing upper-division math was associated with successful completion of college biology. A recent review and synthesis by Long, Conger, and Iatarola (2012) identified a general consensus among scholars of the positive effect of rigorous course-taking

on a variety of academic outcomes identified by the ACT study. Long and colleagues organized course rigor according to three levels identified by the Florida Department of Education with level three being the most rigorous and level one being least rigorous. Employing panel data from public school students in the state of Florida and propensity score matching, Long et al. found that taking rigorous courses resulted in a greater likelihood of earning high test scores, completing high school, and enrolling in college for the students in this study, and that these effects were larger for disadvantaged students and students attending disadvantaged schools. In terms of the subject areas that contribute to increases in math Florida Comprehensive Assessment Test (FCAT) scores, math had the largest effect, with smaller effects for science and social studies and followed by English and foreign language. In terms of predictors of the reading FCAT scores, English and social studies had the largest effect, followed by smaller effects with science, math, and foreign language. Taking level 3 math coursework was positively related to high school graduation and college attendance although the effects were strongest among those who enrolled in just one other level 3 course; the effects diminished and became insignificant for those who enrolled in level 3 coursework in all four subjects. For college attendance, each additional rigor level of coursework by subject was associated with greater likelihood of college attendance.

The second part of Long et al.'s (2012) analysis considered whether the estimated effects of curriculum rigor were comparable across different schools and different types of students, with special attention given to students with slightly above average scores on the FCAT, since "expansion of access to rigorous courses will likely attract or be targeted to slightly above average ability students" (Long et al., p. 307). Taking a level 3 course increased the likelihood of earning a high school diploma more for poor students than for nonpoor Black and Hispanic students as compared to White students and for slightly high-ability students than for above average high-ability students. Taking level 3 courses was also associated with increased rates of attending a two-year, but not a four-year, college among poor students and for slightly high-ability students. Completing rigorous level 3 courses was equally predictive of college enrollment among all racial groups. The authors concluded that most of the beneficial effect on test scores and high school graduations was associated with moving from having no rigorous coursework to one rigorous course in a given area. For college enrollment, each additional level of coursework completed had an additional positive effect.

Although short of experimental design, Long and colleagues (2012) also showed the positive effects of curriculum rigor on a number of college outcomes. Like Attewell and Domina (2008), Long et al. found that the effects of academic rigor on academic outcomes varied by level of intensity, with greater effects on academic outcomes for students on the lower end of ability and with less intensely rigorous curriculum.

Because research generally suggests that Advanced Placement course-taking is related to college enrollment and success (Long et al., 2012), we also review literature that establishes the predictors of a student enrolling in Advanced Placement coursework and the predictors of a school offering Advanced Placement courses. Klopfenstein

(2004b) used Texas data from the 1998–1999 school year to explore the predictors of a student's decision to enroll in AP courses. The largest predictor of non-enrollment among all racial and ethnic groups was low-income status. Predictors of AP enrollment included the presence of role models of the same race for the Black male sample, as well as the presence of an outreach program that incentivized AP participation for Black students overall. Limited English proficiency negatively predicted AP course enrollment for Hispanics who took at least one AP course and for Hispanics who took the SAT.

While researchers have established a relationship between school characteristics and students' academic success as well as individual student prior academic performance and success, Iatarola, Conger, and Long (2011) further contribute to the discussion. They measured course offerings in two ways: whether any student took an AP or International Baccalaureate (IB) course in a given year and the number of students in a given high school who took such a course in a given year. Students' prior academic performance was then divided into three achievement levels: far above average, slightly above average, and below average. The authors found that higher numbers of instructional staff had only a small positive effect on AP/IB offerings, and that the education and experience of teachers was unrelated to these course offerings. Iatarola and her colleagues found that the greatest predictor of AP/IB course availability in high school was having a "critical mass of students with very high eighth grade achievement scores" (p. 342). However, the positive effect of this variable varied across subject area AP/IB course offerings, with the greatest effect on science, followed by math and English; there was virtually no effect on social studies AP/IB course availability. The positive effect also did not operate consistently among students with slightly above average test scores, and in some cases operated negatively. For every 100 slightly above average test score students who enrolled in a given high school, the number of AP/IB courses offered in science and English actually decreased. Finally, schools that enrolled students with below average test scores actually showed an increased probability of offering courses in all four subject areas as did schools with larger non-White populations. Nonetheless, the odds of AP/IB courses being available declined as the percentage of students on free/reduced-price lunch programs increased. Finally, by adding fixed district-level effects and examining changes over time, Iatarola and colleagues showed that the effect of the above average student on the number of students taking advanced courses increased over time. They also showed that schools were offering advanced courses more often regardless of achievement levels, but that these courses continue to be accessed by students with the highest levels of prior achievement.

College Admissions Exams and Stratification Outcomes by Race and Ethnicity

One predictor of entry into a four-year institution is strong SAT or ACT test scores (Alon & Tienda, 2007). Nonetheless, the role of standardized tests in college admissions is a topic of concern among researchers and policymakers, especially given

the continued test-score gaps between racial and ethnic groups and for students from disadvantaged backgrounds (Alon & Tienda). Testing agencies argue, and public perception is, that standardized tests are objective measures of knowledge and can dismantle social stratification by enabling the students with the greatest merit to access and succeed in postsecondary education. Nonetheless, standardized testing can also be viewed as reinforcing hierarchies of privilege because of the persistent test-score differences between groups and the mixed evidence of the predictive power of determining college success among various social identity groups.

Although multiple studies affirm the predictive power of both the old and new SAT scores on college grades (Camara & Echternacht, 2000; Kobrin, Patterson, Shaw, Mattern, & Barbuti, 2008; Ramist, Lewis, & McCamley-Jenkins, 2001), the predictive power tends to be smaller for females, bilinguals, English language learners, and racial and ethnic minorities than for other students (Bridgeman, McCamley-Jenkins, & Ervin, 2002; Grodsky, Warren, & Felts, 2008; Kobrin et al., 2008; Young, 2001). Using data on the fall 2006 cohort entering 110 institutions, Mattern, Patterson, Shaw, Kobrin, and Barbuti (2008) found that the validity and predictive ability of SAT I scores with first year college grade point average varied considerably among students of various background characteristics. The SAT was more highly correlated with grades for females (.52 to .58 across the three sections) than males (.44 to .50), for White students (.53) than underrepresented students of color (.40 to .46), and for monolingual English speakers (.47 to .54) than either bilingual students (.41 to .50) or, worse, English language learners (ELL, .28 to .42). SAT scores also underpredict female and ELL performance and overpredict performance for students of color and bilingual students. In other words, given their SAT score, females and ELLs are expected to earn better grades than they actually do.

Similar analyses have been conducted with those taking the ACT. Using data across cohorts, Noble and Sawyer (2002) found that ACT scores were better predictors of high first-year grade averages but had poorer performance predicting midrange and low first-year grade averages. The authors' conclusion, which was also echoed by Mattern and colleagues (2008), was that the combination of high school grades and test scores tended to yield the most accurate estimates of first-year grades and that test scores varied among students from different social identity groups.

Whether or not one accepts the notion that SAT or ACT scores have utility and predictive ability, one major shortcoming is that statistical analyses of their effects generally do not consider the contribution to test performance of many unmeasured characteristics, such as private coaching, tutoring, test-preparation classes, and sitting for practice exams. Instead, differences in test performance are attributed primarily to family background and formal schooling processes. These educational activities tend to occur outside of formal schooling, and thus have been termed "shadow education" (Buchmann, Condron, & Roscigno, 2010; Stevenson & Baker, 1992), and may help to explain the persistent test-score gaps and subsequent achievement of test-takers identified in the previous paragraph. In a study employing data from the National Educational Longitudinal Survey, Buchmann and colleagues established that higher-income families make greater use of costly private tutoring and private test-preparation courses to increase scores, thereby contributing to their

higher test-score performance and possibly leading to increased advantages in the college application process.

While many published studies establish the validity and predictive power of the SAT, these same studies can be interpreted in another way, in that the findings do not show strong support or overstate the predictive ability of the SAT or ACT score, and that the variability in college grades is better explained by class rank, high school curriculum, or a parent's social class (Adelman, 1999, 2006; Kao & Thompson, 2003). These conclusions, in concert with the previous discussion of high school exit exams, suggest the value of considering more than test scores and high school GPAs when trying to ascertain the future college performance of underrepresented students.

The public and institutional focus on college entrance exams leads us to discuss the sectors in which these exams are most and least likely valued in admissions decisions. To that end, we turn to an examination of literature on the privilege and access institutions.

College Access by Sector: The “Access” and “Privilege” Institutions

The work presented thus far highlights key policies and interventions that influence the complex path to college—from early childhood programs, to middle school predictors of success in high school, to high school curricular and exit policies, to the role of standardized tests for college admissions. The actual process of applying to and enrolling in college, however, presents another set of complicated decision structures that are part of the higher education landscape in the United States that must also be understood. To help achieve this understanding, we focus on two major sectors of postsecondary entry that are often influenced by policies executed at the state, federal, and institutional level. These sectors are both the most and least likely places where our populations of interest—underrepresented students and low-income students—enroll. We identify these sector locations as (1) institutions of access, which include the community college sector, and (2) institutions of privilege, or the elite/selective sector of higher education that includes four-year private and public institutions. By 2009, two-year institutions enrolled 40% of low-income students, a majority of Latino students, and number of other underrepresented minority students (Adelman, 2006; Baum, Little, & Payea, 2011; Hagy & Staniec, 2002). Meanwhile, as admission rates at selective colleges and universities continue to hit record lows for all students (Avery & Levin, 2009), the percentage of underrepresented minority students who enter such institutions is even smaller. The four-year nonselective sector of higher education has also grown in importance given rising tuition and the increased value of a four-year college degree. Thus, we focus on key policy questions and debates surrounding the sectors that present the widest gateways and the most barriers to entry into US higher education. Debates about the institutions of access such as the community college sector include functions of democratization versus

diversion to the four-year sector, the effectiveness of remedial/developmental education, transfer formulas, and statewide policy on articulation agreements between two- and four-year institutions. Debates within the privileged institutions regarding underrepresented students include the ongoing controversial role played by such interventions as affirmative action, as well as replacement programs that do not consider race in college admissions (that is, race-conscious versus race-neutral programming). The decision to separate our research review into a framework of institutions of access versus institutions of privilege lies in the deeper issue of how educational quality contributes to the goal of increasing educational attainment in the form of a bachelor's degree for underrepresented students. Students who attend the more selective institutions are more likely to graduate than similar students who attend less selective institutions, particularly those offering less than two-year programs (Bowen, Kurzweil, Tobin, & Pichler, 2005). Students who begin their college career at a community college are significantly less likely than students who begin at a four-year institution to earn a bachelor's degree (Doyle, 2009; Long & Kurlaender, 2009). The effect of where one attends college influences outcomes beyond degree completion as well. Recent research shows the role college quality plays in future earnings by race and gender (Andrews, Li, & Lovenheim, 2011) and suggests that college quality plays a role in earnings and job choices after bachelor's degree completion (Long, 2010). Indeed, most research showing the economic returns from attending selective colleges and universities finds that this return remains in effect for decades (Black & Smith, 2006; Dale & Krueger, 2002; Hoekstra, 2009; Hoxby, 2009; Long, 2010). Long reports that the greatest returns for all groups occurred in the 1980s and 1990s, although the economic return from attending a selective college or university is particularly large for low-income and some minority groups. Such institutions remain the most likely vehicles for reaching positions of power and influence and achieving economic prosperity (Bowen & Bok, 1999; Bowen et al., 2005). However, the community colleges enroll the great majority of underrepresented and low-income students (Adelman, 2004, 2006). We now turn to this polarity of enrollment patterns.

The “Access” Institutions: From Remediation to Transfer

The question of whether community colleges serve as an agent of democratization versus diversion for educational attainment such as transfer to the four-year institution has been debated since before the publication of Brint and Karabel's acclaimed *The Diverted Dream* (1989). Since this important work, authors from economics, sociology, political science, and educational policy have contributed to this debate (Brint, 2003; Dougherty, 1994; Doyle, 2009; Long & Kurlaender, 2009; Rouse, 1995). Community colleges serve 50% of beginning college students, and researchers find that as many as 70% of entering community college students aspire to eventually earn a bachelor's degree or higher (Bailey, Jenkins, & Leinbach, 2006). Bragg (2001) reminds us that community colleges serve as an important point of postsecondary

entry for many students who otherwise might not have had the opportunity to pursue a higher education, including low-income students, students of color, recent immigrants, and students who are the first in their families to attend college.

Before delving into the role of this sector in educational attainment, it is important to acknowledge the multiple and often conflicting roles that community colleges assume. Among their many functions, community colleges serve as spaces for life-long learning; they prepare students for earning associate's degrees and certificates, they offer professional development courses for adult learners, they prepare students to transfer to four-year institutions, they serve as dual-enrollment institutions for high school students who want to earn college credit, and they increasingly offer baccalaureate degree programs. With multiple, sometimes competing functions, it is not surprising that community colleges come under fire for not serving their students well. In this section, however, we do not review their competing functions, but focus instead on those functions directly related to postsecondary attainment, including developmental/remedial education, transfer policies with four-year colleges, and structural conditions that facilitate transfer and degree completion.

Developmental/Remedial Education

Developmental/remedial education is an issue of concern for most postsecondary sectors because of the large number of students (50%) who require such services (Bailey, Jeong, & Cho, 2010). We discuss the issue within the section on institutions of access, because developmental/remedial education is primarily relegated to this sector (Cohen & Brawer, 2008; Shaw, 1997; Zeitlin & Markus, 1996). For a short period in the 1970s, most developmental education was not mandated for entering students by two-year institutions, yet with the costs incurred by an increasing number of dropouts and failed remediation, two-year institutions pushed to mandate student assessments to determine placement in a course requisite with a student's academic skill level. Fonte (1997) asserts that, by the 1990s, despite lawsuits alleging unequal college access for disadvantaged and minority students, the trend was to continue the mandated assessments for all students entering community colleges. Studies of community college faculty and administrators affirm the need for mandatory testing (Berger, 1997; Perin, 2006). Yet, despite mandatory placement into remedial courses if minimum scores were not met, evidence is mixed regarding the short-term benefits on course completion or the long-term benefits on degree completion for students who enroll in developmental/remedial education (Boylan, Bliss, & Bonham, 1997).

In a study using data on 68,000 remedial math students and 24,000 remedial reading students in Florida and employing a regression discontinuity design, Calcagno and Long (2008) found positive effects of math remediation on persistence from the first to second year of college and on the accumulation of college credits (including nondegree credits, noncollege-level credits, and college-level

credits), but no effect on college-level credit accumulation or degree completion. In a study using data from 445,000 students enrolled in colleges in Texas and also employing a regression discontinuity design, Martorell and McFarlin (2011) found negative effects on college-level credit accumulation and persistence, but no effect on degree completion. Bettinger and Long (2004), using data from nonselective four-year institutions in Ohio, showed that placing students in remedial education did not decrease their likelihood of attaining a bachelor's degree, but did increase their likelihood of withdrawing from college.

Another avenue of research on developmental education is whether the placement scores predict later educational success. According to Parsad, Lewis, and Greene (2003), 92% of two-year institutions use the scores from ACCUPLACER or COMPASS to determine placement into remedial education classes. After reviewing studies of the predictive validity of the ACCUPLACER and COMPASS assessments, Hughes and Scott-Clayton (2010) conclude that placement scores do a reasonably good job of predicting who will earn a grade of B or higher in the course level they tested into (59–72% accuracy), and who will pass a course with a grade of C or better (63–84% accuracy). They then state the limitations of predictive validity studies, including the fact that, while these studies can predict who will successfully pass a course, they do not offer insights into eventual student success, such as degree completion or the accumulation of course credits. The authors conclude that the “evidence is not as strong as desirable given the stakes involved” (p. 17). They also offer alternatives to special placement, including multiple assessment measures, but conclude that better empirical evidence is needed to determine how to move students successfully through developmental/remedial education.

Researchers and policymakers have used data from remedial education programs to compare different types of service delivery in these programs (Boylan, 2002; Boylan et al., 1997). Such studies compare outcomes associated with integrating remedial coursework into credit-bearing courses rather than relegating these students to nondegree or noncredit courses (Shaw, 1997; Zeitlin & Markus, 1996) or examining whether remedial courses are housed together in one unit (centralized) or housed separately within academic disciplines (decentralized) (Boylan et al.). In a national evaluation study on developmental education, Boylan et al. (1997) and Boylan (2002) identified short-term gains of developmental education on course passing rates but not such long-term gains as baccalaureate degree attainment and identified better course retention and degree completion for students in developmental education at four-year than two-year colleges. The authors speculate that four-year students entered college better prepared than the two-year students, a conclusion similar to that reached by Bettinger and Long (2004) who evaluated four-year college students.

The overall conclusion from research on developmental and remedial education is that the relationship to short-term outcomes such as earning solid college grades is positive, but the long-term effects of remedial and developmental education on degree attainment are not found for students who enroll during their community college years (Hughes & Scott-Clayton, 2010). Developmental/remedial education

appears to have positive effects when students at four-year institutions are included in the sample (Bettinger & Long, 2004).

One of the major challenges in studying developmental/remedial education and establishing a causal link to later academic outcomes is that students who enter developmental or remedial education have weaker academic records than other college students who do not have to enroll in developmental education prior to college entry. Thus, comparing their progress with the progress of students enrolled in regular classes proves problematic. Such comparisons are also problematic because most states and individual institutions have their own policies on whether developmental/remedial education enrollment is required, and each institution may have its own assessments and cutoff scores to determine who requires remediation. Of the studies conducted on remediation, many look at four-year college effects even though most remediation occurs at the two-year level. Further, research on developmental education has been criticized for not explaining how much of any effect is the direct result of the developmental education practices rather than attributable to the combination of services provided to remedial students.

Community College Transfer, Structural Conditions, and Degree Completion

Using propensity score matching with the BPS student survey sample, Doyle (2009) finds that students who first enroll in a community college have lower rates of baccalaureate degree completion than students who begin at a four-year college. Many community college students start their higher education careers with the aspiration of transferring to a four-year school and earning a baccalaureate degree, yet few ultimately do so (Bradburn, Hurst, & Peng, 2001; Horn & Nevill, 2006; Roksa, 2009). Estimates of the share of community college students who transfer to four-year institutions range from 3 to 82%, depending on the data source and the definition of transfer, and whether the analysis includes transfer across states or across institutions within the same state (Cohen, 1994; Florida Community College System, 2001; McHewitt & Taylor, 2004; Moore & Shulock, 2010). The odds of earning any educational credential are lower for community college students than for those who begin at other types of colleges (Adelman, 2006), often because of ineffective counseling, misinformation, lack of remedial support, and other factors (Moore, Shulock, & Offenstien, 2009).

In an effort to facilitate degree completion, some state governments have created legislation regarding transfer and institutional articulation. Statewide articulation agreements are meant to ensure that students do not lose credits in the transition between colleges. From a survey of state administrators, WICHE (2010) identified a range of activities related to transfer and articulation across the 50 states. Some states did not report any articulation activity, 15 reported having a general education common core curriculum, 7 reported a common course numbering system, 22 reported major statewide articulations, 20 reported block credit transfer, and 31

reported a transferable associate's degree. Researchers have established that without such agreements, transfer students risk losing credits or taking incoherent sequences of courses that do not count toward the degree (Bailey, 2003; McCormick, 2003). Nonetheless, the WICHE findings highlight the complexity of researching articulation policies given the range of articulation-like policies available across states.

While statewide articulation agreements are advanced as a promising solution for low transfer rates (WICHE, 2010), evidence on the efficacy of statewide articulation policies is mixed and reflects differences in the definitions of transfer, samples, and analytic methods (Anderson, Sun, & Alfonso, 2006; Roksa, 2009). Roksa evaluated three individual-level studies using nationally representative longitudinal data and reported no relationship between statewide articulation policies and a student's transition from a two-year college to a four-year college. She also examined several institutional-level studies in which the researchers concluded that institutional transfer rates are higher in states with statewide articulation policies compared to states without articulation policies.

In an examination of successful completion of a two-year college, it is important to consider student behaviors as well as institutional contexts that are related to successful completion. A review of recent research that used a variety of national-, state-, and institutional-level data establishes that students are most likely to complete two-year degrees and transfer to four-year colleges if they accumulate transferable credits, are continuously enrolled in their degree programs, withdraw from fewer courses, and enroll in school during the summer months (Moore & Shulock, 2009; Moore et al., 2009). The positive credit accumulation effect on degree completion affirms students' need for access to credit-bearing courses rather than noncredit courses. We encourage readers to review work by Belfield and Bailey (2011) and Goldrick-Rab (2010) for a more detailed discussion of research examining the relationship between student academic behavior and preparation within the two-year college and four-year educational attainment.

In examining institutional issues and college completion, Calcagno, Bailey, Jenkins, Kienzl, and Leinbach (2008) use individual-level data from the National Educational Longitudinal Study and institutional data from IPEDS and establish that attending a large institution with greater percentages of part-time faculty and minority students is negatively correlated with the probability of completing college or transferring. While Calcagno et al. also found that spending on academic support was negatively correlated with degree completion or transfer, other research identified positive relationships between such expenditures and degree attainment (Bound, Lovenheim, & Turner, 2009; Howell, Kurlaender, & Grodsky, 2010). While the bulk of research on two-year students evaluates student behaviors, increasingly researchers (Bound et al., 2009; Calcagno et al., 2008; Howell et al., 2010) are identifying unique effects of the structural components of an institution on two-year and four-year degree completion, an area that also needs investigation in order to understand fully the movement between postsecondary education sectors.

As research on the transfer process from the two-year to the four-year college sector develops substantively and methodologically, the definition of transfer continues to be debated. Indeed, there is little consensus as to which students should be included

in the determination of who constitutes a transfer student. Moreover, the debate about the appropriate definition of transfer is more than a mathematical concern given growing concerns about accountability in higher education (Roksa, 2009). Researchers employ definitions that use varying criteria including aspirations, number of credits completed at the community college level, number of credits completed at the four-year college, transfer status, and markers for college-ready status. Other researchers include students who have completed a specific number of college credits, or calculate transfer based on the number of students who report an interest in transferring, or calculate transfer based on students who enroll in particular college-level transfer courses (Cohen, 1994; Cohen & Brawer, 2008; Hagedorn, 2005; Wassmer et al., 2004). Bradburn et al. (2001) demonstrate the definitional challenge using the Beginning Postsecondary Students Longitudinal Study (BPS). Employing eight different potential transfer student criteria, their analyses showed the pool to be anywhere from 11 to 71% of first-time community college students. Other researchers have attempted similar simulations with other national datasets and state and institutional data, ending up with a similar number of potential pools and wide-ranging transfer rates (de los Santos & Wright, 1989; Dowd & Melguizo, 2008; Wassmer et al., 2004). Thus, establishing who should be included when calculating a transfer pool continues to be an important avenue for future research.

Students who choose to directly apply to and enroll in a four-year selective institution face a series of other challenges mitigated by federal, state, and institutional policies. We now turn to the policy debates within selective colleges and universities.

Access to Elite Colleges and Universities: The Privilege Institutions

Debates concerning the access and success of underrepresented students in elite institutions have focused primarily on the effects of affirmative action, or race-conscious programming, as an intervention to increase racial and ethnic diversity in student bodies in US postsecondary education. Debates have ranged from moral and philosophical discussions regarding the use of this intervention to whether employing such a policy is a more efficient method of admitting a diverse and qualified student body than a system of admissions with no such intervention (Arcidiacono, 2005; Chan & Eyster, 2003; Fryer, Loury, & Yuret, 2008; Moses & Marin, 2006). By 2005, a new line of research documenting the educational benefits of diversity for all students changed the debate from benefits to the individual to benefits to the classroom (Gurin, Dey, Hurtado, & Gurin, 2002). This research was particularly relevant in the 2003 US Supreme Court decision, *Grutter v. Bollinger*, which made the use of race as a factor in college admissions legal once again but with added clarity. While *Grutter* provided much-needed guidance to universities across the nation, the decision could be ignored or legally trumped by institutional autonomy or by state ballot initiatives, as seen in referenda passed in five states across the nation: California, Nebraska, Michigan, Washington, and Arizona (Howell, 2010). The 1990s thus

proved to be the beginning of continued public controversy around the admission of underrepresented students to selective colleges and universities and solidified this issue in American higher education policy. Moreover, the fate of precedents set by *Grutter* is now being reconsidered by the US Supreme Court in *Fisher v. Texas*, which challenges the constitutionality of the Texas' Top Ten Percent Plan and the consideration of race by a traditional affirmative action program.

Affirmative Action as an Intervention

Considerable scholarship that employs various methodological approaches has since emerged, with a particular focus on the effectiveness of affirmative action programs and on whether the absence of this type of intervention equalizes the applicant pool by not giving minority students the advantage of admission with lower test scores. Such work builds on economics research pertaining to taste-based discrimination (Becker, 1957), statistical discrimination (Arrow, 1973; Phelps, 1972), and the effects of affirmative action in the labor market (Coate & Loury, 1993; Lundberg, 1991). In an evaluation of a selective public institution in California, Chan and Eyster (2003) found that adopting an admissions rule that ignores standardized test scores and other measures of academic ability traditionally identified by admissions officers for all applicants is actually inefficient, because doing so does not select the best candidates from any ethnic group. That is, institutions that seek to ban affirmative action because it “lowers” student quality in fact achieve a result that backfires by lowering the quality of all admitted students. Fryer and colleagues (2008) expand on the work of Chan and Eyster by providing a complex theoretical and empirical experiment on what they call the limits of race-neutral approaches, that is, an admissions plan that does not consider race but another factor unrelated to race, such as geography or grade point average. They analyze student outcomes under three regimes: a color-sighted approach that uses traditional affirmative action practices; a color-blind approach that is the equivalent of a race-neutral approach, which instead may incorporate proxies for race and ignore other measures of academic ability; and a laissez-faire approach that essentially does not incorporate affirmative action practices but operates more like a cutoff score, whereby applicants who meet a particular standard are admitted and those who do not are not admitted. These expanded analyses also confirm the findings of Chan and Eyster regarding the inefficiency of a color-blind admissions approach. That is, by measuring the average predicted college rank of the admitted class which they define as the performance of the policy, Fryer and colleagues find that employing color-blind admissions rather than traditional affirmative action results in a loss of efficiency from less than one percentage point to just over six percentage points, depending on the college characteristics including differences in the size and location of elite institutions. Thus, the work of Fryer and colleagues suggests that colleges and universities that are constrained by a color-blind or race-neutral system will employ rules that are likely to lead to an admissions outcome in which some

less-qualified candidates will have a greater chance of being accepted and some more qualified candidates will have less chance of acceptance.

In sum, research that examines the outcome of admitting a well-qualified, racially and ethnically diverse student body in the absence of the intervention of a race-conscious admissions program, or affirmative action, finds that alternative admissions practices that ignore race in selective colleges and universities and instead privilege other less rigorous academic criteria actually yield a less academically qualified group of students of all backgrounds. In essence, the research strongly suggests that affirmative action/race-conscious practices are actually the most efficient method of admitting a qualified and racially and ethnically diverse class of students.

The data used to arrive at such conclusions are varied and diverse in origin and timeframe. The methodologies also rely largely on rigorous econometric techniques. While Chan and Eyster (2003) incorporate administrative data from a highly selective university in California, a state with a formal ban on the use of race in college admissions and an alternative admissions practice, Fryar and colleagues use data from a slightly older national database that includes a much larger sample of selective postsecondary institutions, thereby generating broader and more generalizable analysis. Research suggests that, at both the state and national level, outcomes related to affirmative action as an efficient method of selecting highly qualified underrepresented students at selective colleges and universities is more effective than an admissions system that does not consider race and ethnicity as a factor in college admissions.

What remains unknown is the effect of a multiple admissions plan that includes systematic outreach and financial aid at one university, or even at a state level, as it is methodologically difficult to isolate the effect of one particular intervention among many (Pallais & Turner, 2007). While some research has suggested that a ban on affirmative action does not affect student behavior in terms of sending SAT/ACT score reports (Card & Krueger, 2005), other research finds a significant effect on the college enrollment of underrepresented minority students to selective flagship universities as a result of geographically targeted scholarships (Domina, 2007). Institutional programs targeting low- to middle-income high-achieving students, such as the so-called “no loan” policies, may also play a role in the enrollment of underrepresented students who are also low income. While datasets have expanded to account for a number of demographic and time-varying factors, it is more difficult to account for particular institutional support other than aid (such as the student support programs and programs that facilitate faculty-student interaction) particularly in studies conducted at the national level (Braxton, Hirschy, & McClendon, 2004). Understanding the effects of more isolated interventions, such as the introduction of a new admissions system or the retraction of a program like a ban on affirmative action, provides different angles of analyses to this important policy question. We now turn to these additional interventions and/or retractions regarding college admissions, including state-specific race-neutral admissions programs (e.g., college percent plans) and state bans on affirmative action in college admissions passed by legislation or voter referenda. The research on access to selective institutions is particularly important to low-income and underrepresented

student since the payoff to attending such colleges is higher than for other groups (Dale & Krueger, 2002).

The Percent Plan as an Intervention

The studies synthesized are useful for understanding the tradeoffs in efficiency that may affect institutions employing these race-neutral practices with later cohorts of applicants. The Texas' Top Ten Percent Plan is perhaps the most frequently evaluated such plan in the literature to date; however, its automatic admissions structure recently was modified to a lower percentage in one of the state's premier flagship institutions, the University of Texas at Austin. In a revision of the original version of the percent plan known as House Bill 588, Senate Bill 175 instituted caps on the percentage of entering students who were Top Ten Percent beneficiaries (Horn & Flores, 2012), the result being that a maximum of 75% of enrolled freshmen could be admitted through the percent plan legislation. Such a cap only applies to the University of Texas at Austin and not to other public institutions in the state, as capacity issues do not exist at the same level at other institutions. Nonetheless, more than a decade of policy research on the effectiveness of percent plans as an alternative to a race-conscious/affirmative action approach now exists. This research has focused primarily on two questions: first, is the level of racial diversity achieved with a race-neutral percent plan system the same as it was under a race-conscious admissions system, and second, are students admitted under a race-neutral regime persisting and completing college at reasonable rates (Niu & Tienda, 2010)?

In terms of the relative effects of race-conscious and race-neutral admissions systems on the level of racial diversity at a selective institution, the research overwhelmingly fails to find that a percent plan system increases racial and ethnic diversity to levels achieved under an affirmative action program. Any documented increases were the result of a growing Hispanic student population and not of the alternative admissions policy itself. For example, Long and Tienda (2008) found that the change to a percent admissions plan did not lead to a rebound in the diversity numbers experienced under a traditional affirmative action (i.e., race-conscious) plan. In an earlier study, Kain, O'Brien, and Jargowsky (2005) found some restoration of diversity to pre-ban numbers, but they attributed this finding to the increasing percentage of the minority population over time and not to an "effective" race-neutral program. More recently, Harris and Tienda (2012) confirmed the importance of accounting for the changing demographics in Texas, most notably the increasing percentage of Hispanics, finding that after accounting for the demographic changes in the high school graduation cohorts shows Hispanics at a significant disadvantage to Whites in enrollment outcomes at the state's top two institutions. That is, although the percentage of Hispanic high school graduates had increased over time, their presence in flagship institutions had not. They also find that Hispanic students experienced their lowest application and admissions rates during the years the percent plan was in effect, which resulted in their having a reduced presence at the state's flagship institutions compared to years when affirmative action was in place.

The implementation of a new admissions plan (percent plan) after the retraction of a previously employed model (affirmative action) provides the opportunity to examine such changes via a natural experiment analysis approach often employed in the field of economics and sociology. Such studies employ these methods using a series of datasets at the institutional, state, and national level. Using original survey data complemented by administrative state data, these studies offer unique and thorough analyses of college enrollment while accounting for precollege characteristics of the curriculum, as well as the high school context. The experience of Texas, then, has provided a framework for analyzing multiple changes in admissions plans for other states that are experiencing changes in their admissions system.

What is less known, despite careful attention to rigor and demography, is the extent to which other state higher education policy may be playing a role. For example, other legislative changes to state financial aid programs during a similar policy window are more difficult to isolate. Institutional outreach to particular regions of a state also may have influenced enrollment, although it is not clear to what extent university leadership and institutional presence in the form of regional offices in particular cities may have contributed to such outcomes. Such challenges exist for all policy research of this genre, and understanding how to attend to these external forces with current and future data is an important methodological lesson.

State Bans on Affirmative Action as an Intervention

The thorough and data-rich analyses of Texas admissions policies provide a model for other state-specific work. However, analyses of the effects of race-conscious programs and practices at the national level are also relevant and critical to the larger story of college access in the USA. More recent research on the effects of multiple bans on race-conscious admissions policies that use various national datasets finds remarkably similar results across states: the elimination of affirmative action in the admissions systems of selective institutions lowers the rate of college enrollment for underrepresented students, particularly Black students. Arcidiacono (2005) found that removing affirmative action programs would have the greatest effect on the percentage of Black students attending top-tier schools, which is not an unexpected finding, as it is at selective institutions where affirmative action practices matter most. He estimated that the percentage of Black males attending colleges with an average SAT score above 1,200 falls by over 40%. Removing financial aid advantages would reduce the percentage of Black students who enroll by approximately 9%.

Similarly, in an examination of the effect of a recent series of multiple bans on affirmative action in college admissions, Hinrichs (2012) showed a significant drop in underrepresented student populations at the nation's most selective colleges and universities. In a study controlling for important state-level policies, such as a high-stakes accountability system, a high school exit exam, and a percent plan, Backes (2012) found that fewer Black and Latino students enrolled at the most selective institutions as a result of the state bans, although affirmative action apparently

had not increased the overall enrollment of Black students attending less selective institutions. In short, the effects of affirmative action, as noted in other studies, were limited to the nation's most selective colleges and universities.

Finally, building on the work of Arcidiacono (2005), Howell (2010) provided an analysis that is one of the first to model an individual's choice from a portfolio of colleges by specifying college application decisions as a nonsequential search problem. This model may be applied to other areas, such as the elimination of legacy preferences. The policy simulations show that a nationwide ban on affirmative action would decrease minority enrollment nationally by 2%, although this figure increases significantly after accounting for selectivity. Specifically, implementing race-neutral admissions across the nation would decrease minority enrollment at selective four-year colleges by 10.2%. Howell concludes that instituting heavy recruitment of minority students is the strategy most likely to increase minority enrollment to some extent, but no other method offered, including financial incentives, would increase minority enrollment to pre-ban levels.

While remarkably similar in outcome, the data used to execute each of these "ban-effect" studies vary widely. For example, Arcidiacono (2005) utilizes the NLS 72 and simulates a policy ban, while Hinrichs (2012) and Backes (2012) employ data that fit the policy periods relevant to the bans under review. However, Hinrichs utilizes individual-level data from the CPS and ACS, thus allowing a more detailed perspective on individual student decisions, while Backes incorporates aggregate-level data from IPEDS, essentially trading off this individual-level detail but gaining a larger set of institutions not captured in the census data. Finally, Howell (2010) provides a model of analysis that can be applied to other elite college policies, such as legacy admissions, although like Arcidiacono she employs a policy simulation with unique and rigorous detail relating to the larger application and admissions process that goes beyond the outcome of enrollment.

What remains to be answered among these particularly detailed analyses of affirmative action ban effects? The studies reviewed (e.g., Arcidiacono, 2005; Backes, 2012; Hinrichs, 2012), although with some exception in the Howell (2010) publication, appear to assume that an effect of the bans is largely an individual-level consequence and do not discuss whether this effect might spill over to an institution's reputation or alumni base. Understanding larger contextual and reputational effects for all students, such as the consequences of a reduction in the level of diversity in the student body for all and not just those who are underrepresented, would be a worthy complement to this research base. Understanding the data that would relate to this inquiry would be a logical first step in this line of suggested research.

Data, Demography, and Policy Analysis

Twelve years into the new millennium, educators and policymakers find themselves with unprecedented access to data. In this section, we provide a brief analysis of the advantages and challenges of the data used in the studies reviewed that address the

various stages of the educational pipeline. Each stage of the P-16 pipeline could be examined using data from federal, state, district, and institutional sources. The research reviewed in this chapter included analyses of census data (e.g., ACS, IPUMS, CPS), national datasets (e.g., NLS, NLS, HSB, NELLS:88, NAEP, IPEDS), state datasets (e.g., California, Texas, Florida, Tennessee), district- and school-level data (e.g., cohorts within school districts, a freshman cohort at a single university), and international assessments (e.g., TIMSS, PISA). The studies we reviewed carefully chose data sources that fit their questions of interest and provide information on the effectiveness of new and older educational interventions and programs. In this section, we also assess how these data systems might connect with each other and how well they are poised to examine outcomes for the current and projected demographics of the US population. We begin with an assessment of data for demographic analyses and follow with attention to select datasets associated with the P-16 interventions and programs examined.

Understanding the New Demography

The 2010 US Census and associated databases like the American Community Survey provide exceptional opportunities to assess the changing demographics of the United States. Access to such data is now widely available, thereby allowing policymakers, higher education institutions, nonprofit organizations, and local communities that have the appropriate skill set to assess their own demographics rather than wait for such information to be available from formal governmental reports. This broad range of census data helps to create a portrait of the complex changes in the demographic composition and racial identification in the USA. For example, Latinos as defined today were not so identified in the US Census and other government databases until after 1960, and mixed-race individuals only recently have been able to account for their multiple racial and ethnic origins.

As evidenced in this review, the American Community Survey and the Current Population Survey provide excellent sources of data for understanding the effects of a state-level policy on the educational outcomes of diverse populations by race, ethnicity, citizenship status, household composition, and geographic status. These advantages in measuring changes in educational policy or policy related to educational outcomes are primarily due to the robust representation of state-level data. The details of the variables within these datasets, including in some cases their easy accessibility, provide important opportunities to capture the criteria of the policies under review. The limitations of these data, however, include being unable to assess more detailed measures of educational performance, since the datasets often do not provide data related to transcripts or the school experience. In addition, these data are primarily cross-sectional in nature and thus do not allow for the longitudinal analysis provided by other national datasets, such as the NELLS, ELS, the NLSY, and High School and Beyond (HS&B). Nevertheless, the national longitudinal datasets are not as well suited to examine distinct state policies because they are not representative at the state level.

Finally, growing research considers the impact education has on occupational wages across different decades. Census data offer a number of variables related to the labor market, such as wages, occupational status, and some employment characteristics. The capacity of such datasets to link to other labor market data that is based on the state or county identifier provides even further avenues of research, as the field of educational policy analysis continues to examine the effects of postsecondary attendance and completion. In sum, while the census-related databases are not able to capture academic variables other than educational completion milestones from high school to postsecondary levels, they do provide snapshots of individual behavior that may or may not have been influenced by local, state, or national policies. We now comment on the benefits offered by longitudinal datasets at the national and state level within the P-16 sector.

Early Childhood/Middle School/High School Education Data

Studies that evaluate the long-term effects of interventions in the early childhood and early schooling sectors examined in this review use randomized experiments, as well as data from national longitudinal surveys and associated supplements that are updates to these surveys. The analyses largely examine the impact of programmatic interventions on high school, college enrollment, and college completion outcomes. In some cases, such as the analysis of the STAR class-size experiment in Tennessee, the researchers examine the type of college sector entered (e.g., four-year or two-year, selective or nonselective). The strength of these data and designs lies in the length of time allowed to measure different educational milestones. However, the time and region in which survey respondents were questioned limits the generalizability of the findings, given the demography of that era. That is, we learn a good deal about Black-White differences and gender and income, but not about other racial and ethnic groups that now comprise the largest minority (Hispanics), as well as the fastest growing minority (Asian), in the nation. These growing groups have characteristics such as country of origin and language that likely require alterations of research designs, as well as researcher knowledge of such populations. Nevertheless, the older studies and datasets are models for future research examining the effects of early childhood and early schooling interventions on long-term educational outcomes. Although survey attrition remains an issue for all of these surveys, understanding the issues associated with attrition for various social and cultural groups, including their initial engagement in the survey process, may provide important lessons for researchers.

Access is also a key component of the potential utility of the data for measuring future interventions. The national longitudinal surveys are largely available online, although confidential extracts require additional application and security provisions. While randomized experiments are the gold standard in evaluation research, they are not easily implemented or funded. Researchers should consider coordinating with states and school districts to conduct these types of experiments. We also encourage historical and political analyses of the context in which successful experiments

such as the Tennessee STAR project were designed, executed, and sustained. Legislative histories of policy development may provide an important piece of information for promoting better research methods and project implementation.

The middle school program interventions assessed in this review focus on the effect of mathematics as a stepping stone to more rigorous curriculum. These studies are particularly relevant because of the quality and detail of the data utilized; these data largely come from school district or system databases (Allensworth et al., 2009; Spielhagen, 2006b; Stein et al. 2011). Research on the effects of curriculum interventions demands quality data on students and the schools they attend in order to understand whether curriculum choices are a function of student decisions, the school infrastructure capacity, or some other option not yet evaluated. Such data sources are also attuned to patterns of local curriculum structuring with regard to characteristics of the teaching force and the timing of course offerings.

Such detail is also required for curriculum analyses at the high school level. Our review summarizes research using state databases in Texas and Florida (Conger, Long, & Iatorola, 2009; Long, Iatorola, & Conger, 2009; Long & Tienda, 2008; Martorell & McFarlin, 2011; Harris & Tienda, 2012). Of even greater value are state education systems that link the various stages of the education pipeline via large-scale administrative databases. Much of the college access work has focused on students' experiences of the high school curriculum, which is useful in understanding the effects of college readiness on the likelihood of completing college. However, we ask what value there might be in understanding the middle school curricular context as an influence in the choice of the high school curriculum, and perhaps of college access and completion outcomes. The research consistently points to math, and early algebra more specifically, as a key step toward achieving college access (Adelman, 1999, 2006; Gamoran & Hannigan, 2000; Spielhagen, 2006a, 2006b). What else might be gained by further unpacking the role of math, and perhaps other courses such as science and social studies, earlier in the educational pipeline if good data were available?

We transition now to additional research needs as they relate to the two-year sector across the areas presented in this review.

Community Colleges: Remediation, Transfer, and Articulation Data

Efforts have been made by national nonprofit educational organizations to assist community colleges to develop more systematic data collection initiatives, including the 2003 Achieving the Dream: Community Colleges Count Initiative (ATD) and the Developmental Education Initiative (DEI). The ATD strategy is to have member colleges contribute to newly created state longitudinal data systems to engage in more data-driven policies. The success of this initiative is reflected in the increased capacity of institutional leaders and researchers to collect and analyze data (ATD website, 2012; Lorenzo, 2011). DEI assesses innovations in developmental education and

encourages more rigorous data-driven research related to developmental education (ATD website). Another strategy to assess remediation is to develop standard assessment procedures and cut scores to determine who is placed in remediation in the 50 states. In a recent review of state assessment practices, the National Center for Higher Education Management Systems (NCHEMS) Transitions Study (Ewell, Boeke, & Zis, 2008) concludes that, while there is still some variability in assessment and placement procedures, the trend is toward standardization so that every state employs the same criteria. Hughes and Scott-Clayton (2010) also summarize multistate assessments and reinforce the position held by the NCHEMS review (Ewell et al.). This trend toward standardization, however, does not address important questions, including what cutoff is appropriate for college-level coursework? And, are institutions also moving to standardize their curricula so they align across institutions and across states? In short, future research establishing the effects of remediation on student outcomes should include attention to criteria for placement, transcript data to evaluate student progress, and programmatic information from multiple institutions to ensure comparisons between the same elements. It would also be useful to have more information about the academic support services that are (or should be) available to remedial education students (Bailey et al., 2010; Fonte, 1997).

For many of the questions posed in this section on continued data needs, we turn to the advantages and challenges of state administrative data systems.

The Opportunity of State Administrative Databases in Understanding College Completion for Underrepresented Students

The last 10 years of educational policy research have seen an increasing number of econometric-related studies that use longitudinal, state-level administrative data generally known as student unit record (SUR) data systems. As of 2009, 44 states and the District of Columbia have at least one SUR data system; the total number is 59. Demographic and postsecondary data are among the standard information collected, although to our knowledge, these data generally fail to contain detailed information on such attributes as parental education, number of generations a student has been in the USA, and some English language learner identification variables; such variables are critical to understanding the educational experiences and outcomes of underrepresented populations. The structure of the data systems, which is mandated by a governing agency in each state, varies in terms of the level of attainment in education and in many cases the details of employment that are collected. For example, one state may have a unified system of data that includes K-12, postsecondary, and labor market data, while another may have two or more systems with separate data for K-12, two-year colleges, four-year colleges, financial aid records, and/or labor force participation. Other challenges also remain, such as not being able to link data on teachers and instructors to students in a course offering, although some states such as New York have made progress in this area. Nonetheless, state administrative data systems have numerous advantages, as no national longitudinal

data system has the ability to measure the universe of students, including the mobility of students across and within dimensions of the P-16 pipeline.

Nonetheless, one measure of the growing capacity of these state administrative data systems is the increasing number that share, link, or exchange data with other state agencies (Garcia & L'Orange, 2010). Some states, including Florida and Virginia, also have increased ability to track students into other state service or correctional facilities, which is an area of unexplored outcomes for disadvantaged students. In addition, 32 states collect data on academic history from the K-12 sector, while 15 collect data on labor, workforce, and/or unemployment insurance records (see Garcia & L'Orange, for a GIS presentation of SUR data availability across the USA). States that have the capacity to measure the full spectrum of the education-to-employment pipeline include Alaska, California, Florida, Georgia, Kansas, Kentucky, Maryland, Missouri, New Mexico, North Dakota, Nevada, Oregon, Texas, Washington, and Utah with additional states gaining such capacity over time (See update, for example, in Garcia & L'Orange, 2012).

Yet simply establishing these data systems is insufficient. Increased use of these data also depends on researchers, policymakers, and education leaders receiving required training. Data accessibility and training seminars using federal datasets have become common, thanks to national education agencies, as well as programs offered by universities and think tanks, programs that often are sponsored by private foundations and the federal government. However, we know far less about how to access state data systems in such states as Washington, New York, Illinois, and Georgia. As a start, the State Higher Education Executive Officers has produced a report that surveys varying state rules regarding protocols for accessibility (Ott & DesJardins, 2009). Understanding the policy and procedures to access available data should be as much a part of educational policy discussions as the educational interventions we are studying.

Recommended Areas for Future Policy Research

The 2010 Census reminded us that non-White population growth was at the center of the nation's demography. With a US population of 308 million by 2010, Hispanics constituted over half of the 27.3 million population increase from 2000, although Asians were the fastest growing ethnic group (Ennis, Rios-Vargas, & Albert, 2011). Some regional growth rates within the USA were also particularly notable, with states in the South and West experiencing the largest population growth from 2000 to 2010: Nevada had the fastest rate of growth, while Texas had the greatest increase in numbers (Mackun & Wilson, 2011). By 2010, the USA saw the emergence and growth of a number of "majority-minority" states. As of 2010, five states were officially designated majority-minority: Hawaii (77% minority), California and New Mexico (60%), and Texas (55%); the District of Columbia remained majority-minority with 65% (Humes, Jones, & Ramirez, 2011). Arizona, Florida, Georgia, Maryland, and Nevada are not far from reaching the 50% minority mark. The changing

racial demographics of these states and the nation in general foreshadow important sociocultural, economic, and educational trends the P-16 school sectors will have to face in the near future, a trend that future educational policy analysis and research will also need to more deeply incorporate.

With this context in mind, and in response to our review of research examining the effects of programmatic and policy interventions affecting the nation's college access and completion rates throughout the P-16 sector, we see two main areas that could be further integrated into educational pipeline research. The first is labor market participation both during school and as an outcome of postsecondary credentials earned. Data from the American Community Survey indicate that the economic downturn that occurred from 2008 to 2010 created a labor market in which all groups have experienced a decrease in participation (Howard, 2009). However, despite the hit in labor market opportunities taken by all, individuals with less education, Hispanics, Blacks, and men have (unsurprisingly) fared worse than others (Hoynes, Miller, & Schaller, 2012).

The second area for further research is to disaggregate the effects of student preparation on college completion in a racially and ethnically diverse demography and postsecondary institutional market. Such research includes more attention to college completion by race/ethnicity, as well as differences in the relationship by type of institution beyond the two- versus four-year divide. We recommend particular attention to completion in the four-year nonselective sector that also includes minority-serving institutions.

The Labor Market as Part of the Postsecondary Path

Research on the economic returns to schooling as measured by earnings has been well documented and has helped solidify the importance of education in US society (Card, 1999). The recent proliferation of research (Long, 2010; Yakusheva, 2010) on the connection between postsecondary credential completion and labor market outcomes will likely continue and be enhanced by advances in data availability, including more opportunities to understand population groups beyond characteristics such as gender. Nonetheless, although the role of employment is of great importance to an individual's economic survival, employment during school or as an outcome of school can be a complex pattern to disentangle. Employment is not an educational intervention, but can promote completion by providing financial relief as well as inhibit degree completion by displacing the likelihood of educational achievement.

In regard to outcomes in the P-16 pipeline, we recommend additional research on the relationship between increasingly rigorous high school diploma and measures of employment in a post-2010 economy. In a multidisciplinary review of the relationship between passing the MCE and the earnings in the labor market, Holme and colleagues (2010) conclude that the relationship is ambiguous. While some authors find heterogeneous effects by gender and race (Dee & Jacob, 2006), others do not (Warren et al., 2008). One exception, although particular to one state context, is

Martorell's (2004) study which finds that students who failed the "last chance exit" exam by a small margin had lower earnings than students who passed the exam by a small margin, although this earnings advantage dissipated over time. Research has established that earning a high school diploma does have a causal effect on reducing crime and the type of crimes committed (Lochner & Moretti, 2004). However, it is not clear whether earning the "improved" high school credential will be rewarded by higher wages. A critical question then is whether these newly designed high school diplomas may have more value in the college persistence pipeline leading to college completion than the labor market opportunities for high school graduates.

More research is also needed to understand the extent to which working in college influences postsecondary choice, persistence, and, most importantly, completion. Working while attending a postsecondary institution is a common activity for American youth, as approximately 80% of students work while in college, according to the National Center for Education Statistics (2002). Emerging research using national databases finds that students who begin their higher education at a community college or are from a disadvantaged background usually put in longer hours of paid employment, which ultimately has negative consequences for degree attainment (Roksa, 2010). While the role of working while in college has received increased attention, less research has considered whether the relationship holds across different states and varying local economies. Accounting for state context and local economies is one way to begin to disentangle the relationship between choosing to work and choosing to enter and complete college within a particular timeframe.

The Diverse Nonselective Four-Year Sector

Our consideration of the effects of policy and programmatic interventions at selective four-year and nonselective two-year institutions leads us to recommend that future research also consider the four-year nonselective sector of postsecondary education, a sector that includes most minority-serving institutions. Bound et al. (2009) examine the question of whether declines in college completion rates are mostly due to changes in student preparation for college or the institutional characteristics of the schools attended. They hypothesize that the supply side of higher education may matter more for college completion for some students than the preparation levels with which they enter college. Their analyses show that, overall, preparation (as measured by math scores), institutional resources, and sectoral shifts related to where students first attend college explain the decline in college completion. While this study is noteworthy in the questions it asks about who and what accounts for college completion rates, the authors do not consider differences by race and ethnicity. To engage this angle, we recommend attention to college completion outcomes using robust data systems that include the minority-serving institution (MSI) sector—postsecondary institutions, both public and private, that include Historically Black Colleges and Universities, Hispanic-Serving Institutions,

Tribal Colleges and Universities, and the newly emerging Black-Serving Institutions (See Li, 2007 for further explanation of terms). Attention to this sector, from a rigorous policy analysis perspective, is paramount given the changing demographics in US higher education. In terms of student “customers,” MSIs currently enroll more than 2.3 million students, or approximately 14% of all higher education students (Harmon, 2012). HBCUs enroll about 16% of Black students, while HSIs represent approximately 42% of all Hispanic students—a percentage that is significantly higher in states with high percentages of Hispanic students (Harmon). The merging of state administrative databases, national datasets such as IPEDS with a rich set of institutional characteristics, and information on geographic sector and local labor markets may be fruitful sources of data for accounting for important social context characteristics.

Conclusion

Our efforts to assess P-16 policy research on the college access and outcomes of low-income and underrepresented have yielded a number of insights to guide policy and future research. First, the chapter demonstrates that not all policies have clear, neutral, and consistent effects. The early childhood to college project findings indicate that preschool may help boys in more ways than previously assessed and that the effects of policy experiments across different decades differ to some degree across race and ethnic groups. While methodological advances have strengthened research findings over time, the general conclusion is that participation in such programs yields benefits in years well beyond elementary school. The research on the effects of high school exit exams is much more mixed with regard to outcomes leading to high school graduation, college enrollment, and labor market returns. The inconsistent findings may signal that these state-mandated exams are not working as intended or perhaps that their effect will not be seen for some time. In either case, states continue to adopt these policies despite clear effects. This is not to say that increased standards should not be part of a school development plan. However, policymakers should consider the extent these mechanisms are working toward intended goals before subsequent policy adoption. Remediation is another area of uncertain effects although the short-term benefit of remediation on course completion is perhaps the most consistent finding in this area of research. Profound variation across institutions even within a state system of higher education suggests the need for continued review of whether such variation ultimately benefits or disadvantages the students who fall in this academic category.

The demographic story is also of great consequence for the future of higher education. As the student body shifts to comprise a majority of non-White college enrollees, postsecondary institutions will need to adjust and welcome these students in ways that more effectively address their educational needs than in the past. The elite institutions have remained remarkably stable in their level of race and ethnic diversity in their student bodies over the last 30 years, yet the resistance

to policies that promote diversity from external parties such as voters and some state legislatures is as prominent as ever. Stated differently, the capacity to implement diversity-related policies such as race-conscious admissions has in many cases been taken away from institutions and placed in the hands of state legislatures and voters.

In sum, we have learned that the student pathway to college completion is long, dynamic, and responsive to both program interventions as well as retractions. We have also learned that college completion may be deeply linked with earlier educational interventions. While we do not propose a decrease in attention to college completion, the research indicates that other sectors of the pipeline may be able to contribute to the completion agenda, bringing to light the continued importance of the road to college access for underrepresented students. Given this complexity, the research challenges to isolating impacts of interventions on student outcomes will thus continue. The advantages of new data and the changing demographic groups within the US population will keep the field of educational policy research both intriguing and in need of continued attention.

References

- Achieve. (2012). *College and career readiness agenda*. Retrieved June 15, 2012, from <http://www.achieve.org/college-and-career-ready-agenda>
- Achieving the Dream (ATD). (2012). Downloaded on April 10, 2012, from <http://www.achieving-thedream.org/goal/solution>
- ACT. (2005). *Courses count: Preparing students for postsecondary success*. Iowa City, IA: ACT Policy Report.
- Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment*. Washington, DC: U.S. Department of Education Office of Education Research and Improvement.
- Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college*. Washington, DC: U.S. Department of Education.
- Allensworth, E., Nomi, T., Montgomery, N., & Lee, V. E. (2009). College preparatory curriculum for all: Academic consequences of requiring Algebra and English I for ninth graders in Chicago. *Educational Evaluation and Policy Analysis*, 31(4), 367–391. doi:10.3102/0162373709343471.
- Alon, S., & Tienda, M. (2007). Diversity, opportunity, and the shifting meritocracy in higher education. *American Sociological Review*, 72(4), 487–511.
- Anderson, M. (2008). Multiple inference and gender differences in the effects of early intervention: A reevaluation of the abecedarian, Perry preschool, and early training projects. *Journal of the American Statistical Association*, 103(484), 1481–1495. doi:10.1198/016214508000000841.
- Anderson, G., Sun, J., & Alfonso, M. (2006). Effectiveness of statewide articulation agreements on the probability of transfer: A preliminary policy analysis. *The Review of Higher Education*, 29(3), 261–292.
- Andrews, R. J., Li, J., & Lovenheim, M. (2011). *Quantile treatment effects of college quality on earnings: Evidence from administrative data in Texas* (NBER Working Paper). Cambridge, MA: National Bureau of Economic Research.
- Arcidiacono, P. (2005). Affirmative action in higher education: how do admission and financial aid rules affect future earnings? *Econometrica*, 73(5), 1477–1524.
- Arrow, K. (1973). The theory of discrimination. In O. Ashenfelter & A. Rees (Eds.), *Discrimination in labor markets*. Princeton, NJ: Princeton University Press.

- Attewell, P., & Domina, T. (2008). Raising the bar: Curricular intensity and academic performance. *Educational Evaluation and Policy Analysis*, 30(1), 51–71.
- Avery, C., & Levin, J. D. (2009). *Early admissions at selective colleges* (Working Paper 14844). Cambridge, MA: National Bureau of Economic Research.
- Backes, B. (2012). Do affirmative action bans lower minority college enrollment and attainment? Evidence from statewide bans. *Journal of Human Resources*, 47, 435–455.
- Bailey, D. S. (2003). Swirling changes to the traditional student path. *American Psychological Association Monitor on Psychology*, 34, 36.
- Bailey, T. R., Jenkins, D., & Leinbach, D. T. (2006). *Is student success labeled institutional failure? Student goals and graduation rates in the accountability debate at community colleges* (CCRC Working Paper No. 1). New York: Community College Research Center, Teachers College, Columbia University.
- Bailey, T., Jeong, D. W., & Cho, S. W. (2010). Referral, enrollment, and completion in developmental education sequences in community colleges. *Economics of Education Review*, 29(2), 255–270.
- Barnett, W., & Masse, L. N. (2007). Comparative benefit-cost analysis of the abecedarian program and its policy implications. *Economics of Education Review*, 1, 113–125.
- Baum, S., Little, K., & Payea, K. (2011). Trends in community college education: Enrollment, prices, student aid, and debt levels. New York: The College Board. Retrieved July 2, 2012 from http://advocacy.collegeboard.org/sites/default/files/11b_3741_CC_Trends_Brief_WEB_110620.pdf
- Becker, G. (1957). *The economics of discrimination*. Chicago: University of Chicago Press.
- Belfield, C., & Bailey, T. (2011). The benefits of attending community college: A review of the evidence. *Community College Review*, 39(1), 46–68. doi:10.1177/0091552110395575.
- Berger, D. M. (1997). Mandatory assessment and placement: The view from an English department. *New Directions for Community Colleges*, 100, 33–41.
- Bettinger, E., & Long, B. T. (2004). *Shape up or ship out: The effects of remediation on students at four-year colleges* (No. w 10369). Cambridge, MA: National Bureau of Economic Research.
- Bishop, J. H., & Mane, F. (2001a). The impacts of minimum competency exam graduation requirements on college attendance and early labor market success of disadvantaged students. In G. Orfield & M. L. Kornhaber (Eds.), *Raising standards or raising barriers? Inequality and high-stakes testing in public education* (pp. 51–83). New York: Century Foundation Press.
- Bishop, J. H., & Mane, F. (2001b). The impacts of minimum competency exam graduation requirements on high school graduation, college attendance and early labor market success. *Labour Economics*, 8, 203–222.
- Bishop, J. H., Mane, F., Bishop, M., & Moriarty, J. (2000). *The role of end-of-course exams and minimum competency exams in standards-based reforms* (CAHRS Working Paper 00-09). Ithaca, NY: Cornell University, School of Industrial and Labor Relations, Center for Advanced Human Resource Studies.
- Black, D. A., & Smith, J. A. (2006). Estimating the returns to college quality with multiple proxies for quality. *Journal of Labor Economics*, 24, 701–728.
- Bound, J., Lovenheim, M., & Turner, S. (2009). *Why have college completion rates declined? An analysis of changing student preparation and collegiate resources*. Cambridge, MA: National Bureau of Economic Research.
- Bowen, W. G., & Bok, D. (1999). *The shape of the river: Long-term consequences of considering race in college and university admissions*. Princeton, NJ: Princeton University Press.
- Bowen, W. G., Kurzweil, M. A., Tobin, E. M., & Pichler, S. C. (2005). *Equity and excellence in American higher education*. Paper presented to Thomas Jefferson Foundation Distinguished Lecture Series. Charlottesville, VA: University of Virginia Press.
- Boylan, H. R. (2002). *What works: Research-based best practices in developmental education*. Boone, NC: Continuous Quality Improvement Network with the National Center for Developmental Education, Appalachian State University.
- Boylan, H. R., Bliss, L. B., & Bonham, B. S. (1997). Program components and their relationship to student performance. *Journal of Developmental Education*, 20(3), 2–8.

- Bozick, R., & Ingels, S. J. (2008). *Mathematics course taking and achievement at the end of high school: Evidence from the education longitudinal study of 2002 (ELS:2002)* (NCES 2008-319). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
- Bradburn, E. M., Hurst, D. G., & Peng, S. (2001, June). *Community college transfer rates to 4-year institutions using alternative definitions of transfer* (No. NCES 2001-197). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.
- Bragg, D. D. (2001). Community college access, mission, and outcomes: Considering intriguing intersections and challenges. *Peabody Journal of Education*, 76(1), 93–116.
- Braxton, J. M., Hirschy, A. S., & McClendon, S. A. (2004). Understanding and reducing college student departure. *ASHE-ERIC Higher Education Report*, 30(3), 128.
- Bridgeman, B., McCamley-Jenkins, L., & Ervin, N. (2000). *Predictions of freshman grade-point average from the revised and recentered SAT I: Reasoning test* (Research Report 2000–1). New York: College Entrance Examination Board.
- Brint, S. (2003). Few remaining dreams: Community colleges since 1985. *Annals of the American Academy of Political and Social Science*, 586, 16–37.
- Buchmann, C., Condron, D., & Roscigno, V. (2010). Shadow education, American style: Test preparation, the SAT, and college enrollment. *Social Forces*, 89(2), 435–462.
- Calcagno, J., Bailey, T., Jenkins, D., Kienzl, G., & Leinbach, T. (2008). Community college student success: What institutional characteristics make a difference? *Economics of Education Review*, 27(2008), 632–645. doi:10.1016/j.econedurev.2007.07.003.
- Calcagno, J. C., & Long, B. T. (2008). *The impact of postsecondary remediation using a regression discontinuity approach: Addressing endogenous sorting and noncompliance* (NBER Working Paper 14194). Cambridge, MA: National Bureau of Economic Research.
- Callahan, R., Wilkinson, L., & Muller, C. (2010). Academic achievement and course taking among language minority youth in U.S. Schools: Effects of ESL placement. *Educational Evaluation and Policy Analysis*, 32, 84–117.
- Camara, W., & Echternacht, G. (2000). The SAT I and high school grades: Utility in predicting success in college. *The College Board Research Notes*, RN-10, 1–12.
- Campbell, F., Ramey, C., Pungello, E., Sparling, J., & Miller-Johnson, S. (2002). Early childhood education: Young adult outcomes from the abecedarian project. *Applied Developmental Science*, 6, 42–57.
- Card, D. (1999). The causal effect of education on earnings. *Handbook of Labor Economics*, 3, 1801–1863.
- Card, D., & Krueger, A. B. (2005). Would the elimination of affirmative action affect highly qualified minority applicants? Evidence from California and Texas. *Industrial & Labor Relations Review*, 58, 416–434.
- Center for American Progress. (2009). *Improving academic preparation for college: What we know and how state and federal policy can help*. Washington, DC: Author.
- Center on Education Policy. (2010). *Slow and uneven progress in narrowing gaps*. Washington, DC: Author.
- Center on Education Policy. (2011). *Progress lags in high school, especially for advanced achievers*. Washington, DC: Author.
- Chan, J., & Eyster, E. (2003). Does banning affirmative action lower college student quality? *The American Economic Review*, 93, 858–872.
- Cheng, R. (2008). Financial aid and student dropouts in higher education: A heterogeneous research approach. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. XXIII, pp. 209–240). Dordrecht, the Netherlands: Springer.
- Coate, S., & Loury, G. C. (1993). Will affirmative-action policies eliminate negative stereotypes? *The American Economic Review*, 83, 1220–1240.
- Cohen, A. M. (1994). Analyzing community college transfer rates. In A. M. Cohen (Ed.), *Relating curriculum and transfer* (New directions for community colleges, No. 86, pp. 71–79). San Francisco: Jossey-Bass Publishers.

- Cohen, A. M., & Brawer, F. B. (2008). *American community college*. San Francisco: Jossey-Bass.
- College Board. (2011). Retrieved April 10, 2012, from <http://completionagenda.collegeboard.org/percentage-public-high-schools-offering-ap%C2%AE-or-ib-courses-four-core-subject-areas>
- Conchas, G. Q., & Vigil, J. D. (2012). *Street smart school smart. Urban poverty and the education of adolescent boys*. New York: Teachers College Press.
- Conger, D., Long, M. C., & Iatarola, P. (2009). Explaining race, gender, and poverty disparities in advanced course-taking. *Journal of Policy Analysis and Management*, 28(4), 555–576.
- Dale, S. B., & Krueger, A. B. (2002). Estimating the payoff to attending a more selective college: An application of selection on observables and unobservables. *Quarterly Journal of Economics*, 117(4), 1491–1528.
- Darity, W. Jr., Castellino, D., Tyson, K., Cobb, C., & McMillen, B. (2001). *Increasing opportunity to learn via access to rigorous courses and programs: One strategy for closing the achievement gap for at-risk and ethnic minority students*. Report prepared for the North Carolina Department of Public Instruction.
- de los Santos Alfredo, G., & Wright, I. (1989, Summer). Community college and university student transfers. *Educational Record*, 70(3–4), 82–84.
- Dee, T. (2003). The first wave of accountability. In P. E. Peterson & M. R. West (Eds.), *No child left behind: The politics and practice of accountability*. Washington, DC: Brookings Institution.
- Dee, T. S., & Jacob, B. A. (2006). *Do high school exit exams influence educational attainment or labor market performance?* Cambridge, MA: National Bureau of Economic Research.
- Deming, D. (2009). Early childhood intervention and life-cycle skill development: Evidence from head start. *American Economic Journal*, 1(3), 111–134.
- DesJardins, S. L. (2003). Event history methods: Conceptual issues and an application to student departure from college. In J. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. XVIII, pp. 421–471). Dordrecht, the Netherlands: Springer.
- Dietz, S. (2010). *State high school tests: Exit exams and other assessments*. Washington, DC: Center on Education Policy.
- Domina, T. (2007). Higher education policy as secondary school reform: Texas public high schools after Hopwood. *Educational Evaluation and Policy Analysis*, 29, 200–217.
- Dougherty, K. J. (1994). *The contradictory college: The conflicting origins, impacts, and futures of the community college*. Albany, NY: State University of New York Press.
- Dowd, A., & Melguizo, T. (2008). Socioeconomic stratification of community college transfer access in the 1980s and 1990s: Evidence from HS&B and NELS. *The Review of Higher Education*, 31(4), 377–400.
- Doyle, W. R. (2009). The effect of community college enrollment on bachelor's degree completion. *Economics of Education Review*, 28, 199–206.
- Duncan, G., Ludwig, J., & Magnuson, K. (2007). Reducing poverty through preschool interventions. *The Future of Children*, 17(2), 143–160.
- Dynarski, S., Hyman, J. M., & Schanzenbach, D. W. (2011). *Experimental evidence on the effect of childhood investments on postsecondary attainment and degree completion* (NBER Working Paper No. 17533).
- Ennis, S. R., Rios-Vargas, M., & Albert, N. G. (2011). *The Hispanic population: 2010*. Washington, DC: US Census Briefs, US Census Bureau.
- Ewell, P., Boeke, M., & Zis, S. (2008). *State policies on student transitions: Results of a fifty-state inventory*. Boulder, CO: National Center for Higher Education Management Systems (NCHEMS).
- Florida Community College System. (2001). *AA transfers to the SUS*. Tallahassee, FL: Department of Education.
- Fonte, R. (1997). Structured versus laissez-faire open access: Implementation of a proactive strategy. *New Directions for Community Colleges*, 100, 43–52.
- Fryer, R. G., Jr., Loury, G. C., & Yuret, T. (2008). An economic analysis of color-blind affirmative action. *Journal of Law, Economics, and Organization*, 24, 319–355.

- Gándara, P. (2002). Meeting common goals: Linking K-12 and college interventions. In W. G. Tierney & L. S. Hagedorn (Eds.), *Increasing access to college: Extending possibilities for all students* (pp. 81–103). Albany, NY: State University of New York Press.
- Gamoran, A., & Hannigan, E. C. (2000). Algebra for everyone? Benefits of college preparatory mathematics for students with diverse abilities in early secondary school. *Educational Evaluation and Policy Analysis*, 22(3), 241–254.
- Garces, E., Thomas, D., & Currie, J. (2002). Longer-term effects of head start. *The American Economic Review*, 92(4), 999–1012.
- Garcia, T. I., & L'Orange, H. P. (2010). *Strong foundations: The state of state postsecondary data systems*. Boulder, CO: State Higher Education Executive Officers.
- Geiser, P., & Santelices, V. (2004). *The role of advanced placement and honors courses in college admissions* (Center for Studies in Higher Education Working Paper). University of California, Berkeley.
- Goldrick-Rab, S. (2010). Challenges and opportunities for improving community college student success. *Review of Educational Research*, 80(3), 437–469. doi:[10.3102/0034654310370163](https://doi.org/10.3102/0034654310370163).
- Goldrick-Rab, S., Harris, D. N., & Trostel, P. A. (2009). Why financial aid matters (or doesn't) for college success: Toward a new interdisciplinary perspective. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research*. Dordrecht, the Netherlands: Springer.
- Greene, J. P., & Winters, M. A. (2004). *Pushed out or pulled up? Exit exams and dropout rates in public high schools* (Education Working Paper 5). New York: Center for Civic Innovation at the Manhattan Institute.
- Grodsky, E., Warren, J., & Felts, E. (2008). Testing and social stratification in American education. *Annual Review of Sociology*, 34, 395–404. doi:[10.1146/annurev.soc.34.040507.134711](https://doi.org/10.1146/annurev.soc.34.040507.134711).
- Gutter v. Bollinger, 539 U.S. 306 (2003).
- Gurin, P., Dey, E. L., Hurtado, S., & Gurin, G. (2002). Diversity and higher education: Theory and impact on educational outcomes. *Harvard Educational Review*, 72(3), 330–366.
- Hagedorn, L. S. (2005). How to define retention. In A. Seidman (Ed.), *College student retention: Formula for success*. Westport, CT: ACE/Praeger Publishers.
- Hagy, A. P., & Staniec, J. (2002). Immigrant status, race, and institutional choice in higher education. *Economics of Education Review*, 21(4), 381–392.
- Harmon, N. (2012). The role of minority-serving institutions in national college completion goals. Washington, DC: Institute for Higher Education Policy.
- Harris, A. L., & Tienda, M. (2012). Hispanics in higher education and the Texas top 10% law. *Race and Social Problems*, 4(1), 57–67.
- Hinrichs, P. (2012). The effects of affirmative action bans on college enrollment, educational attainment, and the demographic composition of universities. *The Review of Economics and Statistics*, 94(3), 712–722.
- Hoekstra, M. (2009). The effect of attending the flagship state university on earnings: A discontinuity-based approach. *The Review of Economics and Statistics*, 91, 717–724.
- Holme, J. J., Richards, M. P., Jimerson, J. B., & Cohen, R. W. (2010). Assessing the effects of high school exit examinations. *Review of Educational Research*, 80, 476–526.
- Horn, C. L., & Flores, S. M. (2012). When policy opportunity is not enough: College access and enrollment patterns among Texas Percent Plan Eligible Students. *Journal of Applied Research on Children*, 3(2), Article 9.
- Horn, L., Kojaku, L., & Carroll, C. D. (2001). *High school academic curriculum and the persistence path through college: Persistence and transfer behavior of undergraduates 3 years after entering 4-year institutions* (NCES 2001-163). Washington, DC: National Center for Education Statistics, U.S. Department of Education, Office of Educational Research and Improvement.
- Horn, L., & Nevill, S. (2006). *Profile of undergraduates in U.S. postsecondary education institutions: 2003-04 with a special analysis of community college students* (NCES 2006-184). Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Howard, D. J. (2009). *Labor force participation rates for selected age groups, 2008 and 2009*. Washington, DC: U.S. Census Bureau.

- Howell, J. S. (2010). Assessing the impact of eliminating affirmative action in higher education. *Journal of Labor Economics*, 28(1), 113–166.
- Howell, J. S., Kurlaender, M., & Grodsky, E. (2010). Postsecondary preparation and remediation: Examining the effect of the Early Assessment Program at California State University. *Journal of Policy Analysis and Management*, 29(4), 726–748.
- Hoxby, C. M. (2009). *The changing selectivity of American colleges*. Cambridge, MA: National Bureau of Economic Research.
- Hoynes, H. W., Miller, D. L., & Schaller, J. (2012). *Who suffers during recessions?* (Working Paper 17951). Cambridge, MA: National Bureau of Economic Research.
- Hughes, K., & Scott-Clayton, J. (2010). *Assessing developmental assessment in community colleges: A review of the literature* (CCRC Working Paper No. 19). New York: Community College Research Center, Teachers College, Columbia University.
- Humes, K. R., Jones, N. A., & Ramirez, R. R. (2011). *Overview of race and Hispanic origin: 2010*. Washington, DC: U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau.
- Iatarola, P., Conger, D., & Long, M. C. (2011). Determinants of high schools' advanced course offerings. *Educational Evaluation and Policy Analysis*, 33, 340–359.
- Jacob, B. (2001). Getting tough? The impact of high school graduation exams. *Educational Evaluation and Policy Analysis*, 23, 99–121.
- Kain, J. F., O'Brien, D. M., & Jargowsky, P. A. (2005). *Hopwood and the top 10 percent law: How they have affected the college enrollment decisions of Texas high school graduates*. Dallas, TX: University of Texas at Dallas, Texas School Project.
- Kao, G., & Thompson, J. S. (2003). Racial and ethnic stratification in educational achievement and attainment. *Annual Review of Sociology*, 29, 417–442.
- Klopfenstein, K. (2004a). Advanced placement: Do minorities have equal opportunity? *Economics of Education Review*, 23(2), 115–131.
- Klopfenstein, K. (2004b). The advanced placement expansion of the 1990s: How did traditionally underserved students fare? *Education Policy Analysis Archives*, 12(68), 1–14.
- Kobrin, J. L., Patterson, B. F., Shaw, E. J., Mattern, K. D., & Barbuti, S. M. (2008). *Validity of the SAT for predicting first-year college grade point average* (College Board Research Rep. No. 2008-5). New York: The College Board.
- Kurlaender, M., & Felts, E. (2008). Bakke beyond college access: Investigating racial/ethnic differences in college completion. In P. Marin & C. Horn (Eds.), *Realizing Bakke's Legacy: Affirmative action, equal opportunity, access to higher education*. Sterling, VA: Stylus Publishers.
- Kurlaender, M., & Flores, S. M. (2005). The racial transformation of higher education. In G. Orfield, P. Marin, & C. L. Horn (Eds.), *Higher education and the color line: College access, racial equity, and social change* (pp. 11–32). Cambridge, MA: Harvard Education Press.
- Lee, J. (2012). College for all: Gaps between desirable and actual p-12 math achievement trajectories for college readiness. *Educational Researcher*, 41(2), 43–55. doi:10.3102/0013189X11432746.
- Lee, V. E., & Burkam, D. T. (2002). *Inequality at the starting gate: Social background differences in achievement as children begin school*. Washington, DC: Economic Policy Institute.
- Lewin, T. (2010, July 23). Once a leader, US lags in college degrees. *The New York Times*. Retrieved May 21, 2011, from <http://www.nytimes.com/2010/07/23/education/23college.html>
- Li, X. (2007). *Characteristics of minority-serving institutions and minority undergraduates enrolled in these institutions* (NCES 2008-156). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
- Lochner, L., & Moretti, E. (2004). The effect of education on crime: Evidence from prison inmates, arrests, and self-reports. *The American Economic Review*, 94(1), 155–189.
- Long, B. T., & Kurlaender, M. (2009). Do community colleges provide a viable pathway to a baccalaureate degree? *Educational Evaluation and Policy Analysis*, 31(1), 30–53.
- Long, M. C. (2010). Changes in the returns to education and college quality. *Economics of Education Review*, 29, 338–347.
- Long, M. C., Conger, D., & Iatarola, P. (2012). Effects of high school course-taking on secondary and postsecondary success. *American Educational Research Journal*, 49(2), 285–322.

- Long, M. C., Iatarola, P., & Conger, D. (2009). Explaining gaps in readiness for college-level math: The role of high school courses. *Education Finance and Policy*, 4(1), 1–33.
- Long, M. C., & Tienda, M. (2008). Winners and losers: Changes in Texas university admissions post-Hopwood. *Educational Evaluation and Policy Analysis*, 30, 255–280.
- Lorenzo, G. (2011). The revitalization of American Community Colleges: A synthesis of current initiatives, programs, issues, and challenges. *The SOURCE on community college issues, trends, & strategies* (pp. 1–18). Retrieved May 29, 2012, from <http://www.edpath.com/images/CCPaperFinal.pdf>
- Louie, V. (2007). Who makes the transition to college? Why we should care, what we know, and what we need to do. *Teachers College Record*, 109(10), 2222–2251.
- Lucas, S. R., & Berends, M. (2002). Sociodemographic diversity, correlated achievement, and defacto tracking. *Sociology of Education*, 75, 328–348.
- Ludwig, J., & Miller, D. (2007). Does head start improve children's life chances? Evidence from a regression discontinuity design. *Quarterly Journal of Economics*, 122(1), 159–208.
- Lundberg, S. J. (1991). The enforcement of equal opportunity laws under imperfect information: Affirmative action and alternatives. *Quarterly Journal of Economics*, 106, 309–326.
- Mackun, P., & Wilson, S. (2011). *Population distribution and change: 2000 to 2010*. Washington, DC: 2010 Census Briefs, U.S. Census Bureau. Retrieved May 1, 2012, from <http://www.census.gov/prod/cen2010/briefs/c2010br-01.pdf>
- Marlani, V. (2009). The transition to college from a demographic perspective: Past findings and future possibilities. *Teachers College Record*, 109(10), 2287–2300.
- Martorell, F. (2004). *Do high school graduation exams matter? A regression discontinuity approach*. Unpublished manuscript. University of California Berkeley. Retrieved May 28, 2012, from http://www.utdallas.edu/research/tsp-erc/pdf/wp_martorell_2004_high_school_graduation_exams.pdf
- Martorell, P., & McFarlin, I., Jr. (2011). Help or hindrance? The effects of college remediation on academic and labor market outcomes. *The Review of Economics and Statistics*, 93, 436–454.
- Mattern, K. D., Patterson, B. F., Shaw, E. J., Kobrin, J. L., & Barbuti, S. M. (2008). *Differential validity and prediction of the SAT®* (College Board Research Rep. No. 2008-4). New York: The College Board.
- McCauley, D. (2007). *The impact of advanced placement and dual enrollment programs on college graduation*. Applied Research Projects, Texas State University-San Marcos. Paper 206
- McCormick, A. C. (2003). Swirling and double-dipping: New patterns of student attendance and their implications for higher education. In J. King, E. L. Anderson, & M. E. Corrigan (Eds.), *Changing student attendance patterns: Challenges for policy and practice* (New Directions for Higher Education, No. 121, pp. 13–24). San Francisco: Jossey-Bass.
- McHewitt, E. R., & Taylor, G. (2004). *VCCS transfer: "Cohen Measure" rates for 1993, 1995, and 1997 cohorts*. Retrieved from http://www.vccs.edu/vccsasr/Research/trfcoh04_3yr_rrs.pdf
- Moore, C., & Shulock, N. (2009). *Student progress toward degree completion: Lessons from the research literature*. Sacramento, CA: Institute for Higher Education Leadership & Policy.
- Moore, C., & Shulock, N. (2010). *Divided we fail: Improving completion and closing racial gaps in California's community colleges*. Sacramento, CA: Institute for Higher Education Leadership and Policy.
- Moore, C., Shulock, N., & Offenstein, J. (2009). *Steps to success: Analyzing milestone achievement to improve community college student outcomes*. Sacramento, CA: Institute for Higher Education Leadership & Policy.
- Moretti, E. (2004). Estimating the social return to higher education: Evidence from longitudinal and repeated cross-sectional data. *Journal of Econometrics*, 121, 175–212.
- Moses, M. S., & Marin, P. (2006). Informing the debate over race-conscious policy. *Educational Researcher*, 35(1), 3–5.
- National Center for Education Statistics [NCES]. (2002). *Profile of undergraduates in U.S. postsecondary institutions: 1999–2000* (NCES 2002-268). Washington, DC: U.S. Department of Education.

- Nelson, C. A. (2000). Neural plasticity and human development: The role of early experience in sculpting memory systems. *Developmental Science*, 3(2), 115–136.
- Niu, S. X., & Tienda, M. (2010). Minority student academic performance under the uniform admission law: Evidence from the University of Texas at Austin. *Educational Evaluation and Policy Analysis*, 32(1), 44–69.
- Noble, J., & Sawyer, R. (2002). *Predicting different levels of academic success in college using high school GPA and ACT composite score* (ACT research report series). Iowa City, IA: ACT, Inc.
- Oakes, J. (2003). *Critical conditions for equity and diversity in college access: Informing policy and monitoring results* (UC/ACCORD). Los Angeles: University of California.
- Oakes, J. (2005). *Keeping track: How schools structure inequality* (2nd ed.). New Haven, CT: Yale University Press.
- Oakes, J., & Guiton, G. (1995). Matchmaking: The dynamics of high school tracking decisions. *American Educational Research Journal*, 32, 3–33.
- Ott, M., & DesJardins, S. (2009). *Protection and accessibility of state student unit record data systems at the postsecondary level*. Denver, CO: State Higher Education Executive Officers. Retrieved May 1, 2011, from http://www.sheeo.org/sites/default/files/publications/SUR_Final_Report-20091118.pdf
- Pallais, A., & Turner, S. E. (2007). Access to elites. In S. Dickert-Conlin & R. Rubenstein (Eds.), *Economic inequality and higher education: Access, persistence and success* (pp. 128–156). New York: Russell Sage.
- Parsad, B., Lewis, L., & Greene, B. (2003). *Remedial education at degree-granting postsecondary institutions in fall 2000* (NCES 2004-101). Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Perie, M., Moran, R., & Lutkus, A.D. (2005). *NAEP 2004 trends in academic progress: Three decades of student performance in reading and mathematics* (NCES 2005-464). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
- Perin, D. (2006). Can community colleges protect both access and standards? The problem of remediation. *Teachers College Record*, 108(3), 339–373.
- Perkins, R., Kleiner, B., Roey, S., & Brown, J. (2004). *The high school transcript study: A decade of change in curricula and achievement, 1990-2000*. Washington, DC: US Department of Education, National Center for Education Statistics.
- Phelps, E. S. (1972). The statistical theory of racism and sexism. *The American Economic Review*, 62, 659–661.
- Ramist, L., Lewis, C., & McCamley-Jenkins, L. (2001). *Using achievement tests/SA- II: Subject tests to demonstrate achievement and predict college grades: Sex, language, ethnic, and parental education groups*. New York: College Entrance Examination Board.
- Reardon, S. F., Atteberry, A., Arshan, N., & Kurlaender, M. (2009, April 21). *Effects of the California High School Exit Exam on student persistence, achievement, and graduation* (Working Paper 2009-12). Stanford, CA: Stanford University, Institute for Research on Education Policy & Practice.
- Roksa, J. (2009). Building bridges for student success: Are higher education articulation policies effective? *Teachers College Record*, 111(10), 2444–2478.
- Roksa, J. (2010). Bachelor's degree completion across state contexts: does the distribution of enrollments make a difference? *Research in Higher Education*, 51(1), 1–20. doi:10.1007/s11162-009-9146-7.
- Rouse, C. E. (1995). Democratization or diversion? The effect of community colleges on educational attainment. *Journal of Business & Economic Statistics*, 13, 217–224.
- Saenz, V. B., & Ponjuan, L. (2009). The vanishing Latino male in higher education. *Journal of Hispanic Higher Education*, 8(1), 54–89.
- Schweinhardt, L., Montie, J., Xiang, Z., Barnett, W. S., Belfield, C., & Nores, M. (2005). *Lifetime effects: The high/scope Perry preschool study through age 40*. Ypsilanti, MI: High/Scope Press.

- Shaw, K. M. (1997). Remedial education as ideological battleground: Emerging remedial education policies in the community college. *Education Evaluation and Policy Analysis*, 19, 284–296.
- Shonkoff, J. P., & Phillips, D. A. (2000). *From neurons to neighborhoods: The science of early childhood development*. Washington, DC: National Academy Press.
- Spielhagen, F. R. (2006a). Closing the achievement gap in math: Considering eighth grade algebra for all students. *American Secondary Education*, 34(3), 29–42.
- Spielhagen, F. R. (2006b). Closing the achievement gap in math: The long-term effects of eighth-grade algebra. *Journal of Advanced Academics*, 18(1), 34–59.
- Stein, M. K., Kaufman, J. H., Sherman, M., & Hillen, A. F. (2011). Algebra: A challenge at the crossroads of policy and practice. *Review of Educational Research*, 81(4), 453–492. doi:10.3102/0034654311423025.
- Stevenson, D., & Baker, D. P. (1992). Shadow education and allocation in formal schooling: Transition to university in Japan. *The American Journal of Sociology*, 97(6), 1639–1657.
- Trent, W. T., Orr, M. T., Ranis, S. H., & Holdaway, J. (2007). Transitions to college: Lessons from the disciplines. *Teachers College Record*, 109(10), 2207–2221.
- Turner, S. (2004). Going to college and finishing college: Explaining different educational outcomes. In C. Hoxby (Ed.), *College choices: The economics of where to go, when to go, and how to pay for it* (pp. 13–56). Chicago: University of Chicago Press.
- Tyler, J. H., & Lofstrom, M. (2009). Finishing high school: Alternative pathways and dropout recovery. *The Future of Children*, 19(1), 77–103.
- Unmuth, K. (2011). Hispanic students now majority in Texas public schools. *Dallas Morning News*. Retrieved April 30, 2012, from <http://irvingblog.dallasnews.com/2011/03/hispanic-students-now-majority.html/>
- Walston, J., & McCarroll, J. C. (2010, October). *Eighth-grade algebra: Findings from the eighth-grade round of the early childhood longitudinal study, kindergarten class of 1998–99* (Issue Brief No. 016). National Center for Education Statistics. Washington, DC: U.S. Department of Education.
- Warren, J. R., & Jenkins, K. N. (2005). High school exit examinations and high school dropout in Texas and Florida, 1971–2000. *Sociology of Education*, 78, 122–143.
- Warren, J. R., Jenkins, K. N., & Kulick, R. (2006). High school exit examinations and state-level completion and GED rates, 1975–2002. *Educational Evaluation and Policy Analysis*, 28, 131–152.
- Warren, R. W., Grodsky, E., & Lee, J. C. (2008). State high school exit examinations and postsecondary labor market outcomes. *Sociology of Education*, 81(1), 77–107.
- Wassmer, R., Moore, C., & Shulock, N. (2004). Effect of racial/ethnic composition on transfer rates in community colleges: Implications for policy and practice. *Research in Higher Education*, 45(26), 651–672.
- WICHE, 2010 (articulation) Western Interstate Commission for Higher Education. (2010). *Promising practices in statewide articulation and transfer systems*. Boulder, CO: Author.
- Yakusheva, O. (2010). Return to college education revisited: Is relevance relevant? *Economics of Education Review*, 29(6), 1125–1142.
- Young, J. W. (2001). *Differential validity, differential prediction, and college admissions testing: A comprehensive review and analysis* (College Board Research Report 2001–6). New York: College Board.
- Zeitlin, A. N., & Markus, T. C. (1996). Should remediation be mandatory in the community college? *Community Review*, 14, 27–33.

Chapter 12

Advancing the Study of Student-Faculty Interaction: A Focus on Diverse Students and Faculty

Darnell Cole and Kimberly A. Griffin

Introduction

There has been no shortage of research exploring student-faculty interaction in higher education. Comprehensive reviews by Pascarella (1980), Jacobi (1991), and Crisp and Cruz (2009) offer detailed documentation on the many benefits that undergraduate students accrue based on their interactions with faculty. As we regard this literature, however, we must remember that the face of higher education has changed in many ways, particularly since Pascarella and Jacobi drafted their seminal reviews. College campuses have gone from being largely White to more racially and ethnically diverse environments, with students of color composing large proportions of the student body at many institutions (Ryu, 2008). While we may have some sense of the impact and influence of interactions between students and faculty in the aggregate, there is no comprehensive review of the literature that examines the unique ways in which both undergraduate and graduate students of color experience student-faculty interactions and the outcomes that stem from these relationships.

Further, previous research has largely been focused on understanding student trends and outcomes associated with their interactions with faculty; as a field, we have less often examined and explored the ways in which faculty experience and are shaped by their students. Both institutions and faculty themselves have faced

D. Cole, Ph.D. (✉)

Rossier School of Education, University of Southern California, Waite Phillips Hall
3470 Trousdale Parkway, Los Angeles, CA 90089, USA
e-mail: darnellc@usc.edu

K.A. Griffin, Ph.D.

Higher Education, Student Affairs, and International Educational Policy,
University of Maryland College of Education, University of Maryland,
3214 Benjamin Building, College Park, MD 20742, USA
e-mail: kgriff29@umd.edu

increased critique over the past decade, perceived as de-emphasizing and diminishing the importance of facilitating contact between professors and their students (Arum & Roksa, 2011; Boyer, 1990; Cole, 2008). Over the last 20 years, large research universities in particular have been criticized for reassigning undergraduate teaching, advising, and mentoring to graduate students and adjunct faculty, encouraging tenure-line faculty to place primary importance on research rather than the teaching and development of students (Arum & Roksa, 2011; Zusman, 1999). However, scholarship also suggests that faculty of color spend more time engaging students in and outside of the classroom than their colleagues in a tenure and advancement process that does not reward these behaviors (Tierney & Bensimon, 1996). A body of work is emerging, which explores why faculty decide to mentor students and the personal and professional implications for doing so; yet, this research has not been comprehensively reviewed.

We offer a comprehensive overview of the scholarly literature exploring the frequency and outcomes associated with student-faculty interactions. This review is unique in that it highlights the experiences of individuals from groups historically underrepresented in higher education within these relationships, with emphasis focused on research addressing race and ethnicity, and to a lesser degree gender and first-generation college students. Specifically, this review notes how the frequency, quality, and outcomes of student-faculty interactions vary based on the social identities of those interacting. The review is organized into four sections. In the first section, the ways in which student-faculty interaction has been studied and defined in previous scholarship are addressed, noting the unique ways these relationships are distinctive for people of color. Second, theoretical perspectives useful in understanding the motivation and outcomes of student-faculty relationships are explored. The third and predominant section of this chapter reviews literature documenting the experiences and outcomes of undergraduate students, graduate students, and faculty. The final section identifies areas for future study and highlights the implications of the findings of extant work in the field.

Defining and Measuring Student-Faculty Interactions

Identifying Trends in Research on Student-Faculty Interaction

Although captured mostly in the form of quantitative empirical studies, 50 years of literature on student-faculty interactions can be described in four conceptual movements: faculty roles, academic/social integration, out-of-the-classroom interactions, and student-centered pedagogy. In the first conceptual wave, researchers examined faculty contact with students or the roles that faculty serve when assisting students through their college experience (Gamson, 1967; Snow, 1973; Wilson, Wood, & Gaff, 1974). For example, early empirical studies conducted by Snow (1973) and Wilson et al. measured the frequency of student interaction across six faculty roles: instructor, educational advisor, career advisor, friend, counselor, and campus citizen.

These faculty roles were measured by the number (0 to 5 or more) of conversations that faculty have with students lasting at least 10–15 min. According to Wilson et al., these roles are conceptual categories for defining the content area under which faculty spent time talking to or *in conversation* with students. For instance, as an educational advisor, faculty reported spending time talking to students about “basic information and advice about his academic program,” whereas in the role of counselor, faculty indicated spending time “helping students resolve a disturbing personal problem” (p. 76). These faculty roles were particularly useful as they provided a conceptual lens for interpreting the content of student-faculty discussion and interpreting the result of those discussions accordingly. Wilson et al. reported that 95% of the “faculty reported at least one student interaction in the capacity of instructor and 40% reported five or more such encounters” (p. 78). This meant that faculty spent the majority of their time in discussions with students regarding intellectual or academic matters—interactions that “might be expected to occur most often as a natural extension of instruction given within the classroom” (p. 78). A pivotal conceptualization of student-faculty interactions is borne out of this first wave, yet it offers little insight into the different forms of student-faculty interactions for students of color. In most cases, the students’ race/ethnicity was not specified and minority students were only included or explicitly identified in only a few of these early studies (Cole, 1999; Gurin & Katz, 1966; Wilson et al., 1974).

The second conceptual movement may be attributed to the emergence of college retention theories (Cole, 2010a), Spady’s (1970, 1971) theory on social integration and Tinto’s (1975) integration theory were and are still referenced as guiding conceptual frameworks for studies examining relationships between students’ retention, persistence, and academic and social integration. According to these theorists, student retention is largely based on their ability to integrate socially and academically into the campus life of their institution. Researchers applied these conceptual frames to organize faculty contact outside of the classroom into two categories: academic-related experiences and social-related experiences (Chapman & Pascarella, 1983; Endo & Harpel, 1982; Pascarella & Terenzini, 1978b). For instance, using Tinto’s model of college student attrition, Chapman and Pascarella (1983) reported that students attending liberal arts colleges had more social and academic-related contact with faculty than students attending 4-year institutions. Students attending 2-year community colleges reported even greater frequency of social contact with faculty than students at liberal arts institutions. In either case, students with poor grades and from low socioeconomic status (SES) backgrounds were the most likely to report academic-related contact with faculty. Endo and Harpel (1982) used both Spady’s and Tinto’s theoretical work to ground their analysis and found that informal and formal student-faculty interactions had differential effects on students’ personal/social and intellectual outcomes. Formal interactions or “a perfunctory or professional approach” (p.120) was not as significant to these outcomes as students’ informal interactions with faculty—where *high-contact faculty* were more friendly and student-faculty discussions included a broad range of issues regarding students’ emotional and

cognitive well-being. Interestingly, academic achievement was not significantly correlated with either informal or formal student-faculty interactions.

While students' racial and ethnic backgrounds were not specified in this work, studies specifically examining Black student experiences emerged and began to identify the impact of student-faculty interactions on a variety of educational outcomes, such as academic achievement (Allen, 1992; Allen, Epps, & Haniff, 1991; Davis, 1994), academic self-concept (Cokley, 2000, 2002), access to mentoring (Freeman, 1999; Lee, 1999), and academic success (Fleming, 1984). For example, Fleming's (1984) study of Black students at PWIs and HBCUs suggests that the isolation and despair felt by Black students attending PWIs can be mitigated by the presence of Black faculty, role models, and mentors. In his study on African American males, Davis (1994) reported that students who had high levels of academic integration (i.e., "it is easy to develop close relationships with faculty members on this campus," p. 625) at predominantly White institutions (PWIs) performed well academically. Cokley (2002) further adds that while African American students still report having more positive student-faculty interactions at historically Black college and universities (HBCUs) than PWIs, the quality of those interactions is the strongest predictor of Black students' academic self-concept at PWIs. When studying the experience of high-achieving Black students, Freeman (1999) explains that faculty mentoring and guidance helps to create a greater academic and social connection on campus, which also increases student persistence. In fact, according to Lee (1999), the quality of the minority student-faculty mentoring relationship was more important than faculty race, particularly when considering the opportunity to obtain a mentoring match in one's academic career. In sum, these findings suggest that low student-faculty ratios and higher student-faculty interactions occur more frequently at HBCUs, than with Black students attending PWIs where they are less likely to have such frequent student-faculty interactions. Yet, when Black students at PWIs have high-quality mentors and access to Black faculty and role models, they are less likely to feel isolated and are more likely to succeed academically (Hurtado, Cabrera, Lin, Arellano, & Espinosa, 2009; Kim & Conrad, 2006). Research specific to student-faculty interactions for Latino students attending Hispanic-serving institutions (HSIs) or Asian American students attending Asian American and Native American Pacific Islander-Serving Institutions (AAPIs) or Native American students attending Tribal Colleges and Universities (TCUs) is scant. Although, Nelson Laird, Bridges, Morelon-Quainoo, Williams and Holmes (2007) suggest that the patterns of Latino students attending HSIs are similar to Latino seniors attending PWIs and that these patterns are not the same as African American students attending HBCUs.

The third conceptual movement defines student-faculty interactions primarily through a series of questions measuring the frequency of student-faculty contact, although these interactions involved both academic and social-related kinds of student-faculty contact. The conceptual use of academic and social dimensions, like those used in the second conceptual movement, waned, giving way to the application of different theoretical frameworks such as Astin's involvement theory (1984), Erikson's application of educational production functions (1992), Pascarella's

causal models for assessing the effects of differential college environments (1980), Hurtado and Carter's sense of belonging (Hurtado & Carter, 1997), Coleman's social capital theory (1988), and campus racial climate theory proposed by Hurtado, Milem, Clayton-Pedersen and Allen (1999). In most cases, student-faculty measures were no longer linked conceptually to faculty roles like those studies in the first conceptual movement; rather, studies were designed to assess a set of behaviors that can be measured and interpreted more definitively by frequency and type. For example, Pascarella and Terenzini (1978a, 1978b, 1981) used questions that appeared representative of the six roles identified in the first conceptual movement—instructor, educational advisor, career advisor, friend, counselor, and campus citizen; however, their interpretation was not bound to these faculty roles. Faculty, for instance, were no longer interpreted as students' academic advisor simply because they gave academic advice, nor were faculty perceived to be a friend if they talked with students over coffee, coke, or a snack (a survey question commonly used and reported in several empirical studies published in the 1980s and 1990s; Cole, 2010a).

A more recent group of studies conducted by scholars like Anaya and Cole (2001), Cole (1999, 2007), Erikson (1992), Kuh and Hu (2001), Lundberg and Schreiner (2004), MacKay and Kuh (1994), and Padgett, Johnson and Pascarella (2012) used an extended list of variables, which went beyond the traditional six faculty roles (i.e., instructor, educational advisor, career advisor, friend, counselor, and campus citizen) to include measures like faculty helpfulness, faculty concerns for teaching, and faculty concerns for student development. Many of these studies also considered the differential impact of student-faculty interactions across a variety of students' educational gains like GPA (Anaya & Cole, 2001; Cole, 1999; Strayhorn, 2008), intellectual self-concept (Cole, 2007), learning (Lundberg & Schreiner, 2004), need for cognition (Padgett et al., 2012), Ryff Scales of Psychological Well-Being (Padgett et al.), and a positive attitude toward literacy (Padgett et al.). For instance, Anaya and Cole (2001) reported that talking with a faculty member was positively related to students' GPA, yet visiting informally after class with faculty was negatively correlated with academic performance. Padgett et al.'s (2012) study of first-generation college students indicated that:

First generation students who had good teaching interactions with faculty [i.e. high quality interaction with faculty] report lower performance on cognition [i.e. inclination to inquire and lifelong learning] and well-being [i.e. positive evaluations of oneself] compared to their non-first generation peers (p. 261).

Padgett et al. further suggest that as a result of these findings, first-generation students are likely unprepared for the kinds of faculty interactions they are likely to have and need.

Notably, a fourth conceptual wave appears to be emerging. This wave is defined by researchers establishing seemingly divergent sets of behaviors, which includes potentially contrasting points of contact between students and faculty. One is through faculty critique of students' work, and the other is faculty support and encouragement (Cole, 2008; Suplee, Lachman, Siebert, & Anselmi, 2008). While prior research examining faculty criticism and faculty support as discrete concepts has revealed significant correlations with students' educational gains, these studies

have not used constructive criticism as a construct for exploring effective pedagogical methods for how faculty should interact with students of color in the academic context (Cole, 2008). Constructive criticism is not new in its application toward understanding and defining student-faculty interactions. It is, however, relatively new in its use as a measureable set of behaviors examining the effects of student-faculty interactions on minority college students' educational outcomes. Cole (2008) and Cole and Espinoza (2008) used the following variables to operationalize constructive criticism (i.e., negative feedback about academic work, assistance with study skills, and a composite measure of faculty support and encouragement). While assistance with study skills was negatively related to African American and Latino students' GPA (Cole, 2008), faculty support and encouragement positively impacted the academic performance of students of color (Cole, 2008; Cole & Espinoza, 2008). Cole (2008) concluded that within the conceptual frame of constructive criticism, faculty support and encouragement perhaps provided a buffer for otherwise negative educational experiences.

In fact, a more comprehensive framing of teaching practices and active learning pedagogies is becoming more popular among constructions of student-faculty interactions (Cole, Sugioka, & Yamagata-Lynch, 1999). In an analysis of factors shaping faculty-student interactions outside of the classroom, Cox, Terenzini and Quaye (2010) reported that when faculty encourage interactions with students in class, there are increases in the frequency of student contact out of class; yet, this tends to be truer for male faculty than for female faculty. As a result, Cox et al. (2010) indicated that instructor's classroom pedagogies explained a relatively small percent (9–11%) of the variation in explaining the interactions between students and faculty outside of the classroom. However, Gasiewski, Eagan, Garcia, Hurtado and Chang (2012) explored students' academic engagement in introductory STEM courses and found that when faculty use active learning strategies (i.e., collaborative activities and real-world application) and higher-order cognitive activities (i.e., problem-solving) in class, student learning and engagement are enhanced. When students are actively engaged in the classroom, according to Gasiewski et al. (2012), "they also interact with their professors after class, during office hours, and via email" (p. 251), which supports the concept of *accessibility cues*—the way faculty interact with students in class provides *cues* as to their willingness to interact with students out of class (Cole, 2007; Hurtado et al., 2011; Wilson et al., 1974; Umbach & Wawrzynski, 2005).

Distinguishing Between Forms of Student-Faculty Interaction

Examining different forms or types of student-faculty interactions can promote a better understanding of the nature of student-faculty interactions and why they influence student outcomes (Johnson, Rose, & Schlosser, 2007). For example, Sax, Bryant and Harper (2005) found that there were notable differences between the frequency with which male and female students engaged faculty members. Women

were more likely than men to receive various forms of academic and psychosocial support from faculty and gain access to research opportunities; however, men were more likely to challenge professor's ideas in class and feel their comments were not taken seriously. Further, different forms of student-faculty interaction had a different impact on student outcomes; thus, talking with faculty outside of class was not the same as gaining support, which also differed from working with faculty on research. Cole's (2007) work addressed student-faculty interaction among White and minority students and used factor analyses to organize a list of 15 measures into three categories of student-faculty interaction: course-related faculty contact, advice and criticism from faculty, and establishing a mentoring faculty relationship. In the first form, general course-related faculty contact (6 items) ranges from students seeking information or advice, requesting course information, or discussing course-work. The second form of interactions focuses on academics (3 items), wherein a student and professor might discuss a critique of coursework, writing assignments, or class papers. This interaction is course specific and project focused, emerging primarily from faculty feedback. The third type is a mentoring faculty relationship (6 items), in which a student might spend time with a professor: being a guest in faculty member's home or collaborating on faculty-sponsored research projects. Cole (2007) found that course-related faculty contact and mentoring relationships were both positively related to students' intellectual self-concept. African American and Asian students were less likely to have mentoring relationships with faculty, while White students were more likely to have course-related contact with faculty. Lundberg and Schreiner's (2004) findings that Black and Native American students interact with faculty more often than with their peers, yet are less satisfied with their interactions, also suggest that not all interactions with faculty members are the same in form or quality. Nor do all interactions have the same effect on students from different backgrounds.

D'Abate, Eddy and Tannenbaum (2003) cite a number of relationships which can be based on developmental interactions, or "interactions between two or more people with the goal of personal or professional development" (p. 360). They argue that while mentoring, coaching, apprenticeship, action learning, and training can all involve developmental interactions and have an influence on the outcomes of those engaged in the relationship, they are not at all the same. Developmental relationships can differ; in that, each relationship is composed of a different set of behaviors, lasts for different lengths of time, and varies in intensity. Thus, different interactions form different relationships, which can result in different personal and professional outcomes.

While their work largely reviews mentoring relationships within the business world, D'Abate et al.'s (2003) observations apply to higher education. For example, while students or faculty members may be asked how much time they spend interacting with each other, this is often lumped together under the category of *mentoring* or *advising* without distinguishing between different types of student-faculty interaction or relationships (Baker & Griffin, 2010; Johnson et al., 2007). Advising and mentoring, however, are not synonymous (Baker & Griffin, 2010; Johnson, 2007; Johnson et al., 2007; Schlosser & Gelso, 2001). Advising relationships tend to

be assigned and structured, with the explicit function of providing the advisee with guidance and information in relation to degree completion (Baker & Griffin, 2010; Johnson, 2007). Alternatively, mentoring relationships are often distinguished by a higher level of reciprocity than advising relationships and the inclusion of both professional and psychosocial components (Jacobi, 1991; Johnson, 2007). Further, mentorship is defined as being a reciprocal, personal relationship focused on the achievement and support of the junior member by the mentor, who is more experienced and has demonstrated achievement (Jacobi, 1991). These definitions suggest that very different interactions can take place within these relationships, leading to different student and faculty outcomes.

These ideas are consistent with Kram's theory of mentoring functions (1988) that organizes the multitude of potential functions and outcomes of mentoring relationships into two categories: career and psychosocial. Johnson and colleagues (2007) note that while Kram's framework originated in business, it is useful and applicable in education; although, it has been seldom used in higher education mentoring research. Career functions are related to professional socialization and development and include exposing mentees to important networks and/or protecting them from unnecessary risks and responsibilities. The psychosocial functions reflect relationship quality and include the existence of counseling, friendship, and positive feedback, which are all connected to building mentee identity and a sense of self-worth. In 2009, Crisp and Cruz updated Jacobi's (1991) review and found that mentoring continued to be inconsistently defined. However, their review suggests the literature continues to reinforce three core components of mentoring relationships Kram (1988) and Jacobi (1991) identified (role modeling, psychosocial support, and career support).

Student-Faculty Interaction in Communities of Color

It was not until the third wave of research that students of color were included in studies examining student-faculty interactions in meaningful ways. The research exploring the interactions students of color have with faculty suggests that they are, in part, based on the level of similarity they share. Based on the principle of homophily, humans categorize one another based on social characteristics and then seek to interact with others that are in their own social categories (McPherson, Smith-Lovin & Cook, 2001). In other words, we like to interact with, share information with, and support individuals who we perceive as similar to ourselves. A great deal of research has been conducted demonstrating that individuals tend to form relationships with others of similar age, gender, education, and occupation; however, race/ethnicity is one of the most salient characteristics on which homophilous relationships are based. A review by McPherson and colleagues (2001) chronicled various studies documenting the tendency of individuals to form personal relationships and join groups with individuals from a similar racial or ethnic background.

Research on student-faculty interaction and mentoring appears consistent with the principles of homophily, with several studies suggesting that students of color tend to seek out same-race mentors. Obtaining the benefits of faculty contact and advising is not completely based on the ethnicity of the student's advisor, and students should be urged to look beyond their own racial/ethnic group for mentors; mentoring students of color should be seen as the responsibility of all faculty members, not just scholars of color (Brown, Davis, & McClendon, 1999). However, a student's comfort with a potential faculty mentor appears to be somewhat race related (Banks, 1984; Loo & Rollison, 1986; Patton & Harper, 2003; Tan, 1995; Tinto, 1993). Historically, Black faculty at PWIs have been expected to serve as mentors and address Black student problems and concerns, raised by both students and administrators (Banks, 1984). This trend appears to continue today, although more generally, with graduate and undergraduate students of color seeking out faculty of color for advising, support, and guidance on issues related to their personal and professional development (Lee, 1999; Menges & Exum, 1983; Plata, 1996; Tierney & Bensimon, 1996; Williams & Williams, 2006). Results of a survey of both undergraduate students of color and White students at a University of California campus indicated that students tend to identify with faculty of their own race (Loo & Rollison, 1986). When surveying African American and Asian American undergraduate students at a large, public predominantly White institution, Tan (1995) found that African American students were more likely to have a role model that was of the same race than their Asian peers. Fifty percent of African American participants had same-race mentors and 18% said it was important for the race of their role models to match their own, while only 12% of Asian American participants had same-race mentors and none said it was important for their role model to be of the same race. The desire to have a mentor from the same racial/ethnic background also applied to graduate students of color. For example, in Patton and Harper's (2003) work exploring the power of homophilous interactions for Black female graduate students, participants reported craving opportunities to have interactions with Black female professors based on the ability of these women to understand their experiences and engage as a "sister and a friend" (p. 71).

Although homophilous relationships may hold special benefits for students of color, this desire for sameness can be problematic. The relative lack of diversity in the professoriate leaves students of color with fewer opportunities to form homophilous relationships (Bowman, Kite, Branscombe, & Williams, 1999; Brown et al., 1999). The number of minority professors employed at any predominantly White institution is limited and makes up a small proportion of the wider population of professors on campus. Brown et al. (1999) note that when considered on a national scale, the ratio of students to faculty of color was 58:1, while the ratio was 28:1 for White students and faculty. Based on an analysis of data presented in the *ACE Minorities in Higher Education 2008 Twenty-third Status Report* (2008), these ratios had not changed much by 2005. In that year, the ratio of students of color to faculty of color was 45 to 1, and the ratio for White students and faculty was 20 to 1. If students of color express interest primarily in working and interacting with faculty of color, they may have to compete for the time and attention of a relatively small community of minority faculty (Bowman et al., 1999).

Additionally, the interest of students of color in working with faculty who share their underrepresented status in higher education may create more of a burden for minority faculty. Researchers have repeatedly noted the commitment of scholars of color when working with students, noting that the level at which they engage students exceeds the commitments of their colleagues (Allen, Epps, Guillory, Suh, & Bonous-Hammarth, 2000; Antonio, 2002; Bowman et al., 1999; Griffin, 2008; Menges & Exum, 1983; Tierney & Bensimon, 1996; Umbach, 2006). The high visibility of faculty of color may lead students to view them as role models and potential mentors, and past studies have revealed that both undergraduate and graduate students of color more often seek them out for advising, support, and guidance on issues related to their personal and professional development (Menges & Exum, 1983; Plata, 1996; Tierney & Bensimon, 1996; Williams & Williams, 2006). Tan (1995) suggests that the increasing diversity of predominantly White institutions would only add to the service demands placed on minority faculty: "in the coming years the burden levied on faculty members to serve as role models to an increasing minority population is likely to increase" (p. 50). Thus, it appears that these service obligations are not going to lessen in the coming years; rather, they stand to increase as more students of color take their place at predominantly White institutions and seek support from faculty of color.

The desire to work and interact with those who are like oneself can also shape faculty behaviors, influencing which students professors choose to engage with more closely outside of the classroom or in structured research opportunities. Allen, Poteet and Burroughs (1997) suggest, "mentors will perceive that there are greater rewards to providing mentorship to protégés who are perceived to be similar to themselves than protégés perceived to be dissimilar to themselves" (p. 86). In other words, faculty mentors are also driven by a tendency toward homophily and seek out mentees with whom they share significant similarities and with whom they feel the most comfortable (Bowman et al., 1999). Based on this rationale, White faculty may, and often do, express more interest in interacting with those who are similar to them rather than engaging students of color (Bowman et al., 1999; Brown et al., 1999). Thus, when it is suggested that students of color must be more open to looking beyond faculty of color in their efforts to build relationships with professors, it also must be stressed that White faculty must be more willing to work with students of color, demonstrating greater care and cultural competence, as they reach out to students outside of the classroom.

While more limited, research on the factors motivating faculty of color to work with students also suggests homophily guides their choices to engage students outside of the classroom. For example, Baez (2000) notes the distinctions professors of color make between participation in general and race-related service. The professors in his study had greater difficulty saying no to race-related service activities due to their commitment to the issues addressed, choosing to participate in these activities over more general service obligations. Similarly, Williams and Williams (2006) interviewed junior Black male faculty and found that they were challenged to say *no* to requests for mentorship and guidance from students from underserved groups. Similarly, Reddick (2005) and Griffin (2008, *in press*) found African

American professors in particular reach out to students of color generally and often Black students specifically because they feel a special connection and desire to support them based on their shared experiences of racism and marginalization in the academy.

Theoretical Frameworks Used in the Study of Student-Faculty Interaction

While there is a vast literature documenting the influence of student-faculty interaction, particularly focused on student outcomes, a common critique of this body of scholarship is that it is less often grounded in or used to generate theory (Jacobi, 1991; Johnson et al., 2007). For example, Johnson and colleagues argue “with few notable exceptions, many of the frequently cited studies in this area utilize surveys to simply gauge the frequency of satisfaction with mentorships. Fewer studies work to link method with theory; the most highly refined theoretical models of student-faculty mentoring have rarely been researched” (2007, p. 52). While much of this work is not theoretically grounded, scholars are increasingly applying the following conceptual frameworks to explain various aspects of student-faculty interaction, including motivation to interact, the reasons that these relationships have an influence, and the mechanism by which faculty contact shapes student outcomes. The next section provides an overview of some of these theories and frameworks, which address why individuals choose to engage in, as well as why and how student-faculty interaction can influence important outcomes.

Social Exchange Frameworks

Social exchange frameworks largely address and aim to explain motivations behind interactions. It is important to acknowledge that, to some extent, student-faculty interaction is an expectation associated with the context of higher education. Despite the observed tendency of students to avoid opportunities to interact with faculty, they are required to do so, albeit minimally, through their coursework and classroom experiences (Cotton & Wilson, 2006; Cox & Orehovec, 2007). Similarly, the teaching and service requirements associated with faculty work require some level of interaction with students as professors lead their courses and participate in academic advising, although this certainly varies by individual and institution (O’Meara & Braskamp, 2005).

Despite this, both faculty and students have some level of agency in determining how much they will interact with one another. Theories under the umbrella of social exchange offer opportunities to gain a deeper understanding of how students and faculty members make choices about the extent to which they will interact

(Johnson et al., 2007). According to the principles of social exchange, individuals do not act out of altruism; rather, every relationship is based on an exchange with another party to gain access to something of value (Emerson, 1981). While all interactions come at some kind of cost, relationships continue because they provide valued benefits that cannot otherwise be accessed (Molm, 2006). Based on this understanding, individuals will only adjust their behavior in ways that develop their relationships if they anticipate a significant *profit*, with the benefits of interacting outweighing the costs (Ensher, Thomas, & Murphy, 2001; Gibb, 1999; Homans, 1958).

Social exchange frameworks have been rarely used in higher education research; however, they hold great potential to promote new insights into student-faculty relationships (Johnson et al., 2007). When applied to student-faculty relationships in higher education, social exchange suggests individuals can choose whether they will participate in relationships which have more depth or longer duration than required. Mentoring relationships are one example, where both mentors and mentees may perceive themselves as giving and receiving support, resources, and opportunities for collaboration in exchange for their time and energy through the context of their relationships. While conversations about mentoring and the benefits of student-faculty interaction are often focused on the mentee, mentors can stand to benefit as well. For example, in her research on mentoring in a business context, Kram (1988) notes that mentors can gain access to friendship, enhance their standing within the organization, and provide them with a greater sense of competence and self-worth.

The higher education literature reviewed throughout this chapter documents similar trends, documenting the clear benefits students accrue based on their interactions with faculty. Based on the principles of social exchange, students may continue to contact and interact with professors to gain access to resources and support that promote their educational outcomes. However, less literature has addressed the potential benefits to faculty associated with student interaction, and few scholars have explored what motivates faculty efforts to engage students beyond their work responsibilities. Griffin (2008, 2012a) and Eagan and colleagues (2011) have utilized social exchange frameworks, employing qualitative and quantitative methodologies to deepen understandings of how faculty experience and potentially benefit from their interactions with students and what motivates their participation in mentoring relationships. This research shows how these frameworks are particularly useful in facilitating understandings of why faculty are motivated to engage students in a system that rewards scholarly productivity over mentorship. For example, engaging with well-trained or high-achieving students within the context of research could actually increase productivity rather than distract from research, making these interactions attractive (Eagan, Sharkness, Hurtado, Mosqueda, & Chang, 2011; Griffin, 2008, 2012a). Further, faculty members of color may perceive unique benefits associated with engaging students from underrepresented backgrounds, feeling that it is a way to *give back* and feel connected to their communities (Baez, 2000; Griffin, 2008, 2012a, *in press*).

Socialization

Socialization can be a useful frame for understanding why student-faculty interaction has a positive influence on student outcomes, particularly skill development and persistence. Socialization, or the process of gaining the skills, knowledge, values, and habits associated with the society in which one is a member (Bragg, 1976; Weidman, 2006), is a fundamental process in which higher education can achieve its goals. According to Bragg (1976), socialization includes all learning that takes place in college, capturing both the cognitive and affective dimensions, and is an important mediator for other important educational outcomes like academic achievement, persistence, and degree completion.

In his comprehensive review of student outcomes associated with student-faculty informal contact, Pascarella (1980) identifies higher education as a key socializing agent and notes that this frame is particularly useful for understanding the importance and impact of student-faculty interaction. Weidman has examined both undergraduate and graduate education through a socialization lens (Weidman, 1989, 2006; Weidman & Stein, 2003; Weidman, Twale, & Stein, 2001) and, along with Bragg (1976) and others, highlights the importance of faculty in this process. Faculty have the potential to transmit norms and values in and outside of the classroom through their various interactions with students, including advising, coaching, mentoring, constructive criticism and feedback, and collegiality (Bragg, 1976). Weidman (1989; Weidman & Stein, 2003) notes the influence of faculty throughout the socialization process, addressing their role in engaging students in the social and academic dimensions of campus. He and his colleagues specifically suggest that there is a positive relationship between the frequency and quality of interactions students have with faculty and their level of socialization.

While Hezlett and Gibson (2007) note that literature on mentoring has been largely separated from social capital, or the benefits and costs individuals experience based on social ties, emerging research in this area shares much in common with the principles asserted in the socialization literature. The social capital that students access through relationships with faculty could certainly foster socialization. Laband and Lentz (1995) suggest mentorship can produce positive outcomes in the legal profession, specifically through increased access to knowledge and competencies that may be specific to the organization or institution. Work relying on social capital as a framework highlights the ways in which faculty can provide students of color with information-rich networks, which they may have less access to if they are from lower-income backgrounds or families without long, college-going histories. For example, Palmer and Gasman's (2008) work on Black males and Smith's (2007) study of mentors and mentees of color suggest that interactions with faculty can provide students with an expanded network, resources, information, and translation of cultural values and norms, which ultimately promote achievement and engagement in the campus environment.

Socialization is particularly salient in literature on graduate and professional education, which document how students become aware and come to adopt the norms, values, beliefs, and ways of being within a particular profession, discipline, or the academy more generally (see Austin & McDaniels, 2006; Weidman & Stein, 2003; Weidman et al., 2001). Weidman and colleagues suggest there are three core elements in the academic socialization process: knowledge acquisition, investment, and involvement. Faculty can be a key part of all stages of this process, helping students learn more about their field of study, offering students guidance and introducing them to academic norms, and helping them develop networks that provide access to resources and information (Austin, 2002; Belcher, 1994; Dixon-Reeves, 2003). In their qualitative study of women of color in science, Carlone and Johnson (2007) link the development and maintenance of science identity to socialization, noting that learning experiences and introduction to the norms of science brings one into the science community and fosters a sense of membership. A key component of science identity within Carlone and Johnson's model was recognition, not only of one's self but from others, as a scientist. Faculty had the power through positive recognition (e.g., fellowships, coauthorships and collaborations, invitations to present research) and withholding recognition (e.g., stereotypical assumptions, treatment based on masculine gender norms) to shape science identity for these women, either drawing them in or keeping them on the outskirts of the field.

While more often addressed in the literature on graduate and professional education, some scholars have considered the process of socialization at the undergraduate level (Bragg, 1976; Weidman, 1989, 2006). This is particularly evident in theories about undergraduate student retention and persistence, which are often based on principles of socialization. Astin's involvement theory (1984, 1993) argues that students gain more from the college experience when they invest more physical and mental effort both qualitatively and quantitatively. Involvement occurs along a continuum. More frequent and high-quality interactions with peers and faculty in educationally meaningful activities provide the most productive educational gains and academic success. Tinto's (1993) work connects persistence to students' integration into the social and academic spheres of their campus. Tinto suggests students that are more engaged in campus life (e.g., student-faculty interactions) have greater institutional commitment and thus are more likely to persist.

Until recent years, Tinto's (1993) conception of integration has been rarely challenged as a theory applicable across race/ethnic groups (Hurtado & Carter, 1997; Nora, 2002). As the student population has continued to grow in number, diversity, and complexity, critics have argued that the theory fails to recognize cultural assumptions embedded in its use and that it is particularly problematic when applied to racial/ethnic minority students (Guiffreda, 2006; Hurtado & Carter, 1997; Hurtado et al., 2007; Tierney, 1997, 1999). For example, Kuh and Love's (2000) cultural perspective on student departure highlights the importance of cultural influences and enclaves in developing membership in a campus community. Hurtado and Carter (1997) assert that what is missed in the application of Tinto's theory is students' sense of integration, which is a psychological measure. What often occurs in how Tinto's model is operationalized is that students' participation in campus activities—like

the frequency of student-faculty interactions—is used to interpret students’ level of integration into the campus milieu. Instead of using interactions, which is a measure of behavior, Hurtado and Carter propose using sense of belonging as a way to assess students’ psychological sense of identification and affiliation with the campus community. In doing so, “integration can mean something completely different to student groups who have been historically marginalized in higher education” (p. 4); in that, the racial/ethnic or cultural differences across student groups do not have to be diminished in order to be successful.

Perhaps most relevant to students of color and their relationships with faculty is Museus and Quaye’s (2009) intercultural perspective on minority student persistence. Extending and reconceptualizing Kuh and Love’s (2000) cultural framework, Museus and Quaye argue the importance of cultural agents in college environments. Cultural agents validate students’ cultural backgrounds and promote opportunities for them to meaningfully engage in the campus community. Faculty can serve meaningful roles as cultural agents, promoting student persistence by serving as important sources of support and creating bridges between students’ home and institutional cultures.

Socialization frames acknowledge that faculty can transmit information to students, introducing them to the norms and values of the institution, their professions, and the academy (Bragg, 1976), connecting faculty interaction to important student outcomes, perhaps most notably, persistence and academic achievement. While socialization may help explain the benefits students may accrue from interacting with faculty, this theory does not necessarily provide an understanding of a professors’ motivation to engage with students. Further, they do not account for the faculty experience in mentoring relationships, focusing largely on explaining why interactions are beneficial for the student. Also, they do not fully address the process by which this learning takes place or how knowledge is transmitted.

Social Learning Theory

Social learning theory (SLT) may contribute to the literature on student-faculty interactions by explaining how learning and change happens within these student-faculty relationships. Within this framework, learning is transmitted through social models, which signal what behaviors, values, and attitudes are appropriate and beneficial in certain contexts (Bandura, 1969, 1977). This process occurs through identification, when one person patterns their behavior after another in a way that goes beyond mimicking individual actions or events. Observational learning underlies identification, where individuals make meaning of what is valued or which behaviors are important by internalizing the ways in which models are rewarded or sanctioned based on their actions (Bandura, 1969, 1977; McDowall-Long, 2004; Walton, 1979). It is also important to note that the amount of time that students are exposed to a model, in this case faculty, can be relatively brief yet still have a significant influence on their behaviors over long periods of time (Bandura, 1969).

However, it is also important to note that more nurturing interactions with models increase the likelihood of identification (Walton, 1979).

Scholars suggest perceived similarity to the model promotes identification (Bandura, 1969; Karunanayake & Nauta, 2004; Walton, 1979). This aligns well with the principles of homophily described above, which highlights the interest individuals have in interacting with those perceived as having similar characteristics (McPherson et al., 2001). While principles of homophily suggest that similarity drives interaction and highlights motivation to interact, SLT addresses what happens within the relationship and addresses the increased likelihood that one person will engage in observational learning and demonstrate the behaviors of someone they perceive as similar. Thus, students of color may be more likely to identify with faculty from the same racial or ethnic background, based on the assumption that the outcomes of their behaviors will be similar because they have similar identities (Karunanayake & Nauta, 2004).

Although rarely stated explicitly in research on student-faculty relationships, SLT can be an appropriate way to understand the way learning is transmitted between students and faculty. Role modeling has been identified as a key aspect of these relationships, and students have the potential to learn vicariously by observing faculty as they engage them in and outside of the classroom. Thus, students may be more focused academically, express higher-degree aspirations, and be encouraged to become faculty themselves (Astin, 1993; Pascarella & Terenzini, 2005) based on their observations of faculty behaviors and rewards. Further, research addressing the influence faculty can have as role models connects closely to the principles outlined in social learning theory. For example, Walton (1979) and McDowall-Long (2004) both note that faculty can serve as role models, providing students with behaviors that they can emulate that will ultimately promote their likelihood of retention.

This can be particularly salient in graduate education. Austin (2002) suggests students gain access to information and job skills through their close working relationships with faculty and that young scholars are “keen observers and listeners” (p. 104), attending to and emulating the behaviors of their advisors. Thus, SLT may ultimately explain and account for the ways in which graduate students are trained and ultimately develop the skills that they will embody as faculty. For example, when describing the ways in which they learned to mentor and work with students, Black faculty participating in Griffin’s (2012b) mixed-methods study noted that they largely adopted the behaviors of their own mentors rather than attending some form of training or receiving instruction addressing how to work with students.

Nakamura, Shernoff and Hooker’s (2009) model also speaks to the importance of social learning and modeling. Developed based on data collected from geneticists and their mentees, Nakamura and colleagues’ model explains how mentoring serves as a vehicle, transmitting knowledge about how to do *good work* through memes, or foundational ideas and concepts related to the formation of academic culture, across generations. Their research suggests that ethical values and the ways in which to engage one’s work are most often learned from models. In addition to other strategies like creating a specific environment in the lab and engaging in informal exchanges with students, mentors specifically highlight and emphasize the importance of

teaching through modeling, providing students with the opportunity to learn about what it means to do work through observation of their mentor's work and the work of those the mentor had trained.

Student-Faculty Interaction: Research on Students

As noted above, several articles have been written reviewing the vast literature on the influence of faculty interaction on student outcomes. Perhaps most notable are critical reviews and syntheses by Pascarella (1980), Jacobi (1991), Johnson (2007), Mullen (2007), and Crisp and Cruz (2009). Pascarella's review documents decades of research on the influence of out-of-class, informal interactions with faculty on students' academic and social outcomes. Jacobi's and Crisp and Cruz's focus more explicitly on research which addresses mentoring relationships in higher education. Their work also explicates the multiple ways in which mentoring has been defined, as well as the methodological challenges associated with this research, resulting in a literature base that documents inconsistent findings between faculty relationships and undergraduate student outcomes. Johnson's review constructs student-faculty mentoring relationships in a slightly different way, with a less comprehensive overview of the literature, but a more inclusive analysis of the positive and negative outcomes that student-faculty interaction can have for undergraduate and graduate students, faculty, and organizations.

While the goals of these reviews were to present a comprehensive overview of scholarship on student-faculty relationships and their influence on student outcomes, we focus more narrowly on the frequency, experiences, and outcomes of students of color as they engage faculty in and outside of the classroom. Thus, in addition to presenting studies addressing the frequency with which undergraduate and graduate students of color engage faculty as compared to their peers, we consider the ways in which these interactions have been connected to minority students' educational success within college and universities. First, we present the literature on undergraduate students, with a specific focus on students of color that is presented, followed by a review of the literature on graduate students' interactions with faculty.

Undergraduate Students

Consistent with Tinto's (1993) theory of integration and Astin's (1984, 1993) theory of student involvement, the college impact studies almost unequivocally link frequent and meaningful student-faculty interaction with various measures of students' educational outcomes (Astin, 1993; Pascarella, 1980, 1985; Pascarella & Terenzini, 2005; Tinto, 1993). Two seminal studies, Pascarella (1980) and Pascarella and Terenzini (2005), provide a comprehensive and critical literature review on

student-faculty interaction and its relationship with various college outcomes. Pascarella (1980), as noted earlier, summarized the studies on the impact of informal or out-of-class interaction with faculty on student outcomes, including career plans and educational aspirations, satisfaction, intellectual and personal development, academic achievement, and college persistence. Pascarella's review and analysis found a statistically significant positive relationship between interaction with faculty and these five outcomes. For instance, Black students in their second semester of college who reported high levels of student-faculty interactions also indicated higher educational aspirations, even after controlling for educational aspirations when they entered college.

In an update, Pascarella and Terenzini (2005) summarized the impacts of formal or in-class as well as informal or out-of-class interaction with faculty on college outcomes. Their synthesis also demonstrated the positive link between the amount and quality of interaction with faculty and student outcomes. However, a number of studies have identified the impact of racism or feelings of racial tension, which can impose disruptive psychological and behavioral barriers when students interact with faculty (Cole, 2007, 2011; Gasiewski et al., 2012; Hurtado et al., 2011); in that, infrequent student-faculty contact and the poor quality of faculty relationships can decrease Latino students' academic achievement for instance (Anaya & Cole, 2001; Cole, 2007). Students' racial and ethnic background, as a result, becomes critical when examining the differential effects regarding the type, frequency, and quality of student-faculty interactions. Many scholars have indicated that minority students at times feel alienated, intimidated, segregated, isolated, and "out of place at PWIs" (Suarez-Balcazar, Orellana-Damacela, Portillo, & Andrews-Guillen, 2003), which can have an impact on both student-faculty interactions and their resultant education gains. Notably, African American students attending HBCUs are likely to experience better faculty relations than their African American peers attending PWIs (Allen, 1992; Nelson Laird et al., 2007).

Predictors of Student-Faculty Interactions

Cox et al. (2010) raises a simple yet insightful question—why do some faculty interact with students more than others? Student-faculty interactions do not automatically occur. In many cases there is disengagement between faculty and students, particularly outside of the classroom (Cox & Orehovec, 2007). A number of potential explanations, however, have been offered such as institution type, faculty workload, faculty institutional culture, tenure, and rank (Eagan et al., 2011; Umbach & Wawrzynski, 2005); yet, faculty with a student-centered teaching philosophy (Cox et al., 2010; Cotton & Wilson, 2006; Einarson & Clarkberg, 2004; Golde & Pribbenow, 2000), an amicable personality, and good interpersonal skills (Cox et al., 2010) have emerged as insightful predictors in research on student-faculty interactions (Cole, 2007; Hurtado et al., 2011). To initiate contact outside of the classroom, for instance, students will seek out faculty who provide clear cues in class as to their desirability and interest in interacting with students outside of class (Cole, 2007; Cox et al., 2010).

These in-class teaching styles and behaviors are known as accessibility cues, which include active learning strategies, problem-solving activities, *not* feeling bored in class, challenging a professor's idea in class, and working on a group project facilitated by the faculty (Cole, 2007; Cox et al., 2010; Wilson et al., 1974). For students of color, *not* being treated as a token in class (i.e., as a symbolic gesture toward inclusion and or considered a spokesperson for one's entire race) (Cole, Bennett, & Thompson, 2003; Hurtado et al., 2009) and employing Steele's (1997) "*wise schooling*" pedagogical practices offer additional *cues* that faculty may employ when interacting with students outside of the classroom; Steele asserts, for instance, that providing students with challenging work, building students' self-efficacy, affirming that they belong (academically) in college, valuing multiple perspectives, providing role models, and creating a *safe* student-faculty relationship in which responses to students are nonjudgmental provide pedagogical practices that reduce stereotype threat and increase the educational success of students of color. Arguably, *wise schooling* can be extended to other students of colors where stereotype threats are likely to inhibit their academic engagement and educational success (Cole, 2008; Steele, 1997).

Students who are more intellectually and personally stimulated by what happens in their formal academic program (i.e., classroom) may seek additional interactions with faculty members as means of further enhancing the personal satisfaction or stimulation they gain in the classroom (Hurtado et al., 2011). Student who perceived faculty as concerned about their well-being will often seek to develop close relationships with faculty and report the most academic growth (Cole, 2010a, 2010b). Better academically prepared students tend to devote more effort to their studies and interact more with faculty members (Kuh & Hu, 2001). This is likely due to both the tendency of these particular students to seek out the faculty members as well as faculty initiating contact with high-performing students (Bean & Kuh, 1984). Other factors that increase the likelihood of student-faculty interactions include students having similar interest and aspirations as faculty and students in search for faculty mentors who can help them develop professionally (Cole, 1999; Pascarella, 1980). For instance, Hurtado et al. (2011) found that underrepresented "students majoring in biomedical and behavioral science-related fields] were able to establish relationships with faculty by discovering simple strategies, such as clearly communicating with faculty about their career goals and interest in science" (p. 572).

Student-Faculty Interaction and Persistence: Conditional Effects

The bulk of research prior to the 1990s demonstrated the general, yet positive impact of student-faculty interaction on college outcomes by utilizing aggregated student samples. More recent studies, however, have stressed the *conditional* effects of interacting with faculty (Cole & DeAngelo, 2010). Conditional effects assume that the type, nature, and quality of interaction with faculty and the impact of these interactions might not be the same for all students (Cole, 2010b). While studies that focus on the general effects of student-faculty interactions have found almost

unequivocally positive effects on students' educational outcomes, research that examines the conditional effects of student-faculty interactions is inconclusive but offers important differential findings by race, gender, first-year experience, institution type and size and first-generation status.

Race: For students of color, racism or feelings of racial tension can play a significant role in the type, nature, and quality of student-faculty interactions and thus result in differential educational gains by race (Cole, 2007, 2010a, 2010b; Lundberg & Schreiner, 2004). Faculty members play an important role in students' campus integration (Tinto, 1993), and because student-faculty interactions have been shown to differ by race, both in quality and frequency, it is crucial to consider faculty influence when examining the academic success of students of color (Lundberg & Schreiner). Decreased interactions with faculty, for instance, can lead to lower academic performance for minority students (Anaya & Cole, 2001; Lundberg & Schreiner, 2004). Since faculty have been shown to initiate contact with students who perform well, poor-performing minority students may feel that faculty are less willing to interact with them (Cole, 2007, 2010a, 2010b; Lundberg & Schreiner, 2004). Minority students who experience or perceive resistance to interacting with faculty members due to racial or ethnic insensitivity are likely to initiate fewer student-faculty interactions, which hinder their overall academic achievement (Cole, 2007; Nora & Cabrera, 1996; Strayhorn, 2008). For example, African American students have reported that their academic ability was not taken seriously by faculty (Fries-Britt & Turner, 2001). They have also felt alienated and experienced racism formally and informally when interacting with faculty at predominantly White institutions (Cole & Jackson, 2005).

In studies involving Latino students, Hernandez (2000) found that they were more likely to persist when faculty paid attention to them as individuals and cared for their educational and personal well-being. Anaya and Cole (2001) found that frequency and quality of interactions with faculty had a positive impact on Latino students' academic achievement. In another study by Cole (2010b), however, student-faculty interactions were not significant for Latino students' GPA. Cole and Espinoza (2008) found that faculty support and encouragement had a positive effect on the academic performance of Latino students majoring in STEM (science, technology, engineering, and mathematics) fields, although negative feedback from faculty about students' academic work and satisfaction with the amount of faculty contact was not significant toward predicting the grades of Latino students in STEM majors.

Asian American students often have the lowest frequency and perceived quality of interactions with faculty among all ethnic groups. For example, Kim, Chang and Park (2009) found that Asian American students were less likely than other ethnic groups to report that faculty provided them with respect, emotional support and encouragement, advice, honest feedback, intellectual challenge and stimulation, and personal interest. Kim et al. also found that although Asian American students were more likely than their peers to be involved in research activities, they were the least likely to communicate, talk, and interact with faculty. Not surprisingly, research has shown that Asian American students often report lower levels of satisfaction

with faculty contact compared with White students (Kim & Sax, 2009; Kim, 2010). Despite the low quality and sometimes negative interactions Asian American students have with faculty, research has found that they are still likely to persist, perform well academically, and succeed in college. Such contradiction has raised new avenues for future research.

Native American students reportedly have higher rates of interactions with faculty, indicating “higher levels of working harder due to faculty feedback, asking for writing advice, and working to meet faculty expectations, but they also reported slightly less satisfying relationships with faculty members” (Lundberg & Schreiner, 2004, p. 559). Lundberg and Schreiner suggest that perhaps faculty have lower expectations or give unbuffered critical feedback, which likely results in negative reactions from Native American students. Several studies have indicated that there is a positive association between quality interactions with faculty and Native American students’ persistence (Brown & Robinson Kurpius, 1997; Jackson, Smith, & Hill, 2003; Lundberg, 2007). In general, the research has shown that Native American students who perceive warmth, care, and especially understanding from faculty regarding the stress of being a Native American student, are more likely to persist. However, Cole and Jackson (2005) also found that although Native American students reported the highest percentages for challenging a professor’s ideas, they also reported the highest percentages for feeling that faculty did not take their in-class comments seriously.

Gender. Student interactions with faculty have also been shown to differ by gender, although findings are often inconsistent across studies (Colbeck, Cabrera, & Terenzini, 2001; Kezar & Moriarty, 2000; Kim & Sax, 2009; Kuh & Hu, 2001; Rayman & Brett, 1995; Sax et al., 2005). Some research showed that student-faculty interactions positively influenced men’s self-rated public speaking ability (Kezar & Moriarty) and women’s graduate degree aspirations (Tsui, 1995). Others reported student-faculty interactions negatively impacted women’s mathematical self-concept (Sax, 1994) or had no impact at all on women’s critical thinking skills (Frost, 1991). Similarly, studies also found that positive interactions with faculty increased men’s confidence in their ability to become engineers (Colbeck et al.). Rayman and Brett found that receiving career advice from faculty positively contributed to women’s persistence in science careers upon college graduation. These mixed findings reveal that there are nuances in the student-faculty relationship that differentially influence male and female students (Sax et al., 2005; Pascarella & Terenzini, 1991, 2005).

The positive effects of student-faculty interaction on students’ scholarly self-confidence and degree aspirations have the potential to increase students’ educational success. Yet, some studies found that women tended to report more frequent interactions with faculty and were more satisfied with these interactions than men (Kim & Sax, 2009; Sax et al., 2005). Given that previous research has indicated the different student-faculty educational outcomes across race and ethnicity (Cole, 2004; Lundberg & Schreiner, 2004), the differential impact of gender warrants additional investigation (Sax et al.). Further, it is important to consider how race intersects with gender, examining whether and how interactions and outcomes differ for men and women of color.

Academic Year. For many students, contact with faculty increases during their time in college. Faculty make themselves more available to juniors and seniors, often because upper-division students are more confident in their thinking and content knowledge (Kuh & Hu, 2001). Students are also likely to have smaller classes in upper-division courses. However, the impact of course-related student-faculty interactions is the most influential on the support for learning perceived by first-year students; although Umbach and Wawrzynski (2005) report that when differences in institution type are considered, the effects of academic year are no longer statistically significant.

The level of academic challenge first-year students receive from faculty is a positive indicator of growth in students' general knowledge base and practical competencies (Umbach & Wawrzynski, 2005). In fact, the frequency of interactions focusing on intellectual or course-related matters correlates with freshmen year academic performance (GPA), self-perceived intellectual growth (Pascarella & Terenzini, 1978a, 1983; Anaya & Cole, 2001), and a greater likelihood of participating in health science research programs (Hurtado et al., 2008). Hurtado et al., for instance, found that students of color in biomedical and behavioral sciences are more likely to become involved in faculty research during their first year of college; they further suggest that student-faculty interactions increase when structured programs are available for students of color in STEM-related majors and when those programs are encouraged by older peers.

Institutional Type and Size. Faculty influence is more pronounced at institutions where students feel "...challenged and engaged in active and collaborative learning activities" (Umbach & Wawrzynski, 2005, p. 163). The frequency and quality of these types of student-faculty interactions typically occur more often at small liberal arts colleges (Kuh & Hu, 2001; Kuh, Vesper, Connolly, & Pace, 1997; Umbach & Wawrzynski, 2005). This is often attributed to college environments that engage in effective educational practices, which include "faculty use of active and collaborative learning techniques, level of academic challenge faculty provided students, level of importance faculty placed on enriching educational experiences, and the amount of emphasis faculty place on higher order cognitive activities" (Umbach & Wawrzynski, 2005, p. 161). In the few studies that examined student-faculty interaction at community colleges, Chang (2005) found that students generally experienced low levels of interaction with faculty. Barnett (2010) found that community college students were more likely to persist if faculty showed higher levels of care and validation of students' identity and knowledge.

Institutional type, and perhaps institution size by proxy, can also affect student-faculty interactions for students of color (Cole, 1999; Cole & Jackson, 2005). For instance, several studies have indicated that HBCUs provide a more supportive campus climate and satisfying college experiences for African American students, in part because HBCUs tend to be smaller in size and have larger faculty-to-student ratios (Allen, 1992; Fleming, 1984; Kim, 2004; Kim & Conrad, 2006; Nelson Laird et al., 2007; Outcalt & Skewes-Cox, 2002). According to Nelson Laird et al., African American seniors at HBCUs, when compared to their peers at PWIs, are more likely to ask questions in class; contribute to class discussions; discuss grades,

readings, and career plans with faculty; as well as work with faculty outside of the classroom. African American students at HBCUs are also more likely to become involved with faculty research projects (Kim, 2004; Kim & Conrad, 2006); yet Hurtado et al. (2008) did not report significant differences between HBCUs, HSIs, and PWIs when predicting African American students' participation in health science research programs. Students of color, however, are better equipped to succeed in science, mathematics, and engineering fields with support from peers and faculty members (Bonous-Hammarth, 2000; Leslie, McClure, & Oaxaca, 1998). For example, REM students in science and engineering who persist toward graduation typically highlight the role of a faculty member as instrumental to their degree attainment (Cole & Espinoza, 2008; Leslie et al., 1998). While Cokley (2002) reported that GPA was more influential for Black students at PWCUs, Berger and Milem (2000) reported that Black students' academic self-concept at HBCUs was influenced more by the quality of interactions with peers and faculty. Most of these studies have found that Black students tend to benefit more in terms of academic achievement and college attainment at HBCUs than at PWCUs (Allen, 1992; Berger & Milem, 2000; Davis, 1994; Sellers, Chavous, & Cooke, 1998).

Generation Status. An additional subset of studies has reported the significant impact of student-faculty interaction on persistence of first-generation college students. For example, Martin-Lohfink and Paulsen (2005) found that interactions with faculty were unrelated to the persistence of continuing-generation students, but had a substantially positive effect on the first-to-second year persistence of first-generation students at 4-year institutions. The positive impact of interaction with faculty on college outcomes for first-generation students may be anticipated; yet, the adequate and positive interactions may not be present for these students. Kim and Sax (2009) found that first-generation students at 5-year institutions had fewer opportunities to work with faculty on research projects, communicate with faculty outside of class, and interact with faculty during lecture than non-first-generation students.

Student-Faculty Interaction and Academic Success

Many scholars have identified the benefits of student-faculty interactions (Astin, 1993; Cole, 2007; Pascarella & Terenzini, 2005). The positive associations between student-faculty relationships and educational outcomes have been shown not to be merely a product of entering student characteristics, but rather the environmental factors facilitating these interactions (Pascarella & Terenzini, 1978a). While these student-faculty interactions have shown positive influences on personal growth, their most significant impact is in the area of academic integration and intellectual and academic development (Kuh & Hu, 2001; Pascarella & Terenzini, 1978a; Terenzini & Pascarella, 1980; Volkwein, King, & Terenzini, 1986).

Although an increased frequency of student-faculty interactions is associated with academic achievement, not all types of exchanges contribute equally to intellectual development (Pascarella & Terenzini, 1978b, 1981). Students who spend

more time receiving advice from faculty about their educational program report significantly higher academic self-confidence (Astin, 1993; Endo & Harpel, 1983). The quality of the student-faculty relationship is most important in predicting actual influence on academic achievement and positive impact on student grades (Anaya & Cole, 2001; Endo & Harpel, 1982; Terenzini, Theophilides, & Lorang, 1984). If educators are going to leverage the reported educational benefits of student-faculty interactions, understanding the frequency, type, and process by which these interactions take place is essential (Cox & Orehovec, 2007; Sax et al., 2005).

One way in which student-faculty interactions assist in developing academic integration is by facilitating the student's acclimation to the academic environment and encouraging them to learn about and engage institutional norms and values (Kuh & Hu, 2001). Academic integration increases a student's intellectual engagement, which is positively related to academic performance (Chapman & Pascarella, 1983; Pascarella, 1980; Pascarella & Terenzini, 1976; Tinto, 1975, 1993).

Student-faculty informal interactions have also been shown to influence academic performance criteria like grade point average (GPA); this seems true for all students, as long as students of color perceive those relationships as supportive and encouraging (Cole & Espinoza, 2008; Kim, 2010; Pascarella & Terenzini, 2005). This is attributed to faculty members' ability, as representatives and guardians of the academic culture of an institution, to influence students' academic success through support and encouragement, intellectual discussions in and out of the classroom, and student-centered pedagogies (Anaya & Cole, 2001; Cox et al., 2010; Gasiewski et al., 2012).

Students most often engage faculty in functional interactions, which are interactions outside of the classroom but have a specific academic function or purpose, such as asking academic or institutionally related questions (Cox & Orehovec, 2007; Kuh, Schuh, Whitt, & Associates, 1991). While functional interactions around class-related material may be the most frequent, these interactions can lead to deeper, more personal interactions when students and faculty members find common interests (Cox & Orehovec, 2007). Personal interactions between students and faculty beyond the course material lay the foundation for mentoring and the development of a caring relationship that further encourages students' academic growth (Cox & Orehovec, 2007; Endo & Harpel, 1983). One approach for developing meaningful student-faculty interactions and mentorship is through structured research program experiences (Hurtado et al., 2008). Yet, Black students in biomedical and behavioral sciences are less likely to participate in structured research programs—at least without receiving advice from a junior or senior and/or maintaining high social self-confidence. Hurtado et al. (2008), Kinkead (2003), and Nagda, Gregerman, Jonides, Von Hippel and Lerner (1998) reported that research experiences with faculty, particularly with faculty who model research professionalism, boost academic adjustment and achievement.

Having a personal relationship with a faculty member can also motivate students to adopt institutional norms, which enhances the likelihood of their educational success (Kuh & Hu, 2001). This socialization process encourages students to conform to high academic standards, which is usually rewarded with good grades

(Bean & Kuh, 1984) since students produce better quality work and earn higher grades when faculty impose rigorous standards and establish high expectation for student performance (Ayres & Bennett, 1983). Lundberg and Schreiner (2004), however, reported that working to meet the expectations of faculty was not a significant predictor of learning for African American or Native American students. In fact, when compared to their White peers, African American and Native American students reported having the most interactions with faculty but had the “lowest perceptions of faculty relationships” (p. 559). Yet, when Latino students in STEM fields receive support and encouragement from faculty, those interactions significantly contributes to their academic performance (GPA) (Cole & Espinoza, 2008). In one of a few studies that explore the reciprocal relationship between student-faculty interactions and good grades, Kim (2010) found that frequent contact between faculty and African American and Latino students positively affects GPA—and good grades lead to more frequent interactions between faculty and students.

There are a number of barriers, however, to developing student-faculty interactions that have been negatively linked to the academic success of underrepresented minority students. Greene, Marti and McClenney (2008) state “college faculty who lack a requisite level of cross-cultural skills, or worse, who are indifferent and/or discriminatory in their interactions with minority students, can create significant barriers for minority student persistence” (p. 516). Choices of curriculum, modes of instructional delivery, and *accessibility cues* have been found to influence the success of students of color. In particular, predominantly White college faculty have been found to display culturally bound pedagogical approaches: a one-size-fits-all style of teaching that may not be effective with the diverse college students. Steele’s (1997) construct of *wise schooling* offers a comprehensive set of strategies that counter such barriers, particularly when developing meaningful relationships between faculty and students of color, indeed for all students. Moreover, providing students with advising that is humanized (i.e., being seen as human and caring for URM), holistic (i.e., beyond courses and include financial and other support systems), and proactive further extends Steele’s strategies and is especially effective with students of color (Museus & Ravello, 2010).

Graduate and Professional Students

Frequency of Student-Faculty Interaction

Although similar to undergraduate students, the interactions and relationships graduate students have with professors are quite distinctive. For example, while faculty may advise both graduate and undergraduate students, the relationships are more time intensive in graduate education (Adams, 1992; Baird, 1995; Barnes & Austin, 2009). Developmental interactions, and ultimately mentoring and advising relationships, between graduate students and faculty also tend to be longer and have greater

emotional intensity (Austin, 2002; Johnson, 2007; O'Neil & Wrightsman, 2001; Tenenbaum, Crosby, & Gilner, 2001). Further, the intensive relationship between faculty advisor and student is a hallmark of the US model of graduate education and serves a key vehicle for teaching, learning, and research (Barnes & Austin, 2009; Kelly & Schweitzer, 1999; Nakamura et al., 2009).

Despite the importance and centrality of these relationships in graduate education, it is unclear whether graduate students of color have access to mentorship in ways similar to their peers. There are inconsistent findings regarding the frequency with which graduate students of color engage faculty members, particularly in mentoring relationships. Some researchers suggest that students of color are less likely than their peers to engage with faculty, and several scholars note the challenges graduate students of color may have in finding mentors (Antony & Taylor, 2004; Brown et al., 1999; Patton & Harper, 2003; Patton, 2009; Waldeck, Orrego, Plax, & Kearney, 1997). Waldeck et al.'s (1997) study of graduate students at a large Western university suggests that Black, Latina/o, and Asian American students are less likely than their White peers to be engaged in mentoring relationships. Patton's (Patton & Harper, 2003; Patton, 2009) qualitative work on Black women in doctoral programs highlights the challenges these women faced in finding faculty mentors, particularly those that shared their racial and gender identities.

While some scholars suggest that students of color face difficulty when finding faculty mentors, others note that students of color have equal access to support from faculty. For example, Waldek and colleagues (1997) found that African American students found it relatively easy to gain access to mentoring, despite their underrepresentation among students who were actually engaged in these relationships. Although international students were less likely to have mentors than White students and students of color, there were no significant differences in mentoring patterns of graduate students of color and White students in a study by Kelly and Schweitzer (1999). Dixon-Reeves (2003) also notes that 97% of her sample of recent Black Ph.D. recipients had mentors in graduate school, with most having more than one.

Student-Faculty Interactions and Graduate Student Socialization

Much of the literature examining the importance of mentoring in graduate education has attended to the role that these relationships play in socializing students into graduate education and academia. As noted above, graduate student socialization can be understood as the process through which students are introduced to the norms, values, and beliefs consistent with and necessary for success within their field of study (Austin, 2002; Belcher, 1994; Brown et al., 1999; Kirk & Todd-Mancillas, 1991; Weidman et al., 2001). Student-faculty interactions are a central part of this process as such interactions create opportunities for students to learn more about what it means to enter a specific field, profession, or discipline.

Little research attends specifically to the ways in which student-faculty relationships foster or challenge the socialization process of graduate students of

color. Black graduate students in Gasman, Hirschfeld, and Vultaggio's (2008) study reported challenges in navigating graduate school and getting access to information, indicating a lack of guidance which challenges their efforts to engage in the socialization process. Daniel's (2007) analysis of narratives from 15 Latino and Black graduate students suggests that the low expectations and racism these students face from faculty leaves them disillusioned. Despite their acknowledgment of the importance of faculty support, participants in this qualitative study largely viewed White faculty with distrust rather than as key agents of socialization. Black graduate students in Antony and Taylor's (2004) qualitative study had mixed relationships with faculty. Supportive advisors encouraged socialization by providing their students with important information, support, and guidance, while negative interactions with other faculty made them feel unwelcome and less connected to their field. Further, wise schooling practices (Steele, 1997), which included faculty affirmations, encouragement, and high expectations, appeared to foster socialization and to reduce experiences of stereotype threat among Black graduate students (Antony & Taylor, 2004).

Student-Faculty Interaction and Graduate Student Academic Outcomes

The role of the graduate faculty mentor is often distinguished by an emphasis on career development beyond one's educational experience, offering long-term guidance as one enters the professional world (Baird, 1995; Waldeck et al., 1997). Faculty are also engaged in direct learning experiences, helping their students prepare for exams, as well as developing their writing and presentation skills through feedback and collaboration. Perhaps most notably, relationships in graduate education provide students with support as they engage in their dissertation research. In addition to supervising the student's project and offering general encouragement and guidance, a faculty mentor can be particularly helpful with identifying an idea or topic of study, the development of methodological skills, and the interpretation of findings (Baird, 1995).

Little research has examined the unique ways in which faculty interactions can translate to academic and career outcomes for graduate and professional students of color. However, the literature generally suggests that graduate students who have mentors report increased levels of interest in becoming professors, better academic performance, increases in critical thinking ability, academic skill development, and more success in their efforts to obtain research grants and fellowships (Adams, 1992; Belcher, 1994; Hill, Castillo, Ngu, & Pepion, 1999; Kelly & Schweitzer, 1999). The assistance graduate students receive in terms of coauthorship and collaborative research opportunities, development of writing skills, and career exploration is positively related to students' reported number of publications and conference publications (Tenenbaum et al., 2001). The positive outcomes associated with mentorship can also be long term and related to job placement, postgraduate productivity, and self-efficacy (Dixon-Reeves, 2003; Johnson et al., 2007; Paglis, Green, & Bauret, 2006).

Social Support and Sense of Belonging

Faculty interactions also appear to support graduate students' psychosocial development in robust ways (Johnson et al., 2007). Work by Tenenbaum et al. (2001) suggests that satisfaction with one's advisor, mentoring relationship, and graduate school overall is related to the psychosocial support received from one's faculty advisor. Similarly, work by Waldeck and colleagues (1997) indicates that graduate students emphasize the psychosocial over the career functions in their mentoring relationships, with the socio-emotional support they received being related to satisfaction with professional relationships with faculty mentors. The important forms of psychosocial and emotional support faculty can provide for students of color have also been noted in the literature, largely uncovered through qualitative inquiry. For example, Black female graduate students participating in Patton and Harper's (2003) study highlight the importance of the psychosocial support they receive, particularly from their Black female mentors, describing these relationships as resembling a form of mothering that consists of "nurturing, care, concern, worry, and honesty" (p. 71). Participants in Antony and Taylor's (2004) study also applauded and regarded the psychosocial support they received from their mentors as critical to their persistence and success.

Although there are clear psychosocial benefits associated with student-faculty interactions, emergent literature highlights the implications of negative interactions with faculty. Intuitively, we know that the quality of students' interactions with faculty, especially their advisors, can vary. While many faculty advisors are attentive and supportive of their students' growth and development, there are professors who are not as focused on acting in their students' best interests. Anecdotally, we know that these experiences do occur; yet, we have little understanding of how these negative interactions influence the growth and development of graduate students in general, or graduate students of color specifically.

Work by Eby and colleagues (Eby & Allen, 2002; Eby, Butts, Lockwood, & Simon, 2004; Eby, McManus, Simon, & Russell, 2000) begin to suggest how negative mentoring experiences might influence the performance and achievement of graduate students. Eby et al. (2000) collected quantitative and qualitative data from participants in an executive development program on participants' frustrating developmental relationships. Participants' responses led to the identification of five meta-themes that capture the reasons why mentees have difficult relationships with their mentors: a mismatch in values, work style, or personality (Match Within the Dyad); the mentor treated the mentee badly or did not have time to work with them (Distancing Behaviors); the mentor used their power in tyrannical ways and either took credit for the mentee's work or tried to sabotage the mentee (Manipulative Behavior); the mentor lacked expertise and was unable to help their mentee (Lack of Mentor Expertise); and the mentor displayed either negative attitudes toward the organization the dyad worked within or had general personal problems that prevented them from focusing attention on the mentoring relationship (General Dysfunctionality) (Eby et al., 2000, 2004). All five factors were associated with limited career and psychosocial support from mentors and have the potential to

negatively affect mentee's perceptions of relationship quality, depressed mood, and job withdrawal (Eby et al., 2004). Findings of an additional study indicated that distancing/manipulative behaviors as well as lack of mentor/mentee fit resulted in decreased job satisfaction and increased stress (Eby & Allen, 2002).

These negative aspects of relationships with faculty can hold special relevance for graduate students of color who have often reported encountering faculty doubts about their abilities, stereotypes, and alienation. For example, women of color participating in Carlone and Johnson's (2007) qualitative study explained how their scientific identities were *disrupted* by a lack of recognition of their skills as scientists, racially based accusations, and low expectations (p. 1203). Similarly, although Black graduate students in Antony and Taylor's (2004) study had mostly positive relationships with their advisors, they suffered from challenging interactions with other faculty who subjected them to stereotypes and had low expectations about their academic abilities. Johnson-Bailey, Valentine, Cervero and Bowles (2009) reported similar findings in a study of 586 Black graduate school alums. Survey respondents reported negative relationships with faculty, consisting of low expectations and multiple forms of subtle and overt racism. Students reported that White professors expected students to speak for the entire race and underestimated the intelligence of Black students. Qualitative analysis in the same study revealed that these negative relationships left students feeling isolated and alienated from their graduate school experiences. Participants described their experiences in graduate school as something they "endured and survived" (p. 195), relying on supportive peers and their own persistence to complete their graduate programs.

Student-Faculty Interaction: Research on Faculty

While much attention in the literature has focused on the frequency, type, and outcomes associated with student-faculty interaction generally, researchers have less often considered the extent, nature, and outcomes associated with these encounters from the faculty perspective. Teaching, research, and service are frequently noted as the three principle functions of American colleges and universities (Astin, 1995; Birnbaum, 1988; Bowen, 1997), and faculty are asked to balance participating in these three activities. Although expectations about the extent to which they will engage in these three activities vary based on the mission and type of institution, most faculty are expected to engage in some form of service as part of their professional responsibilities. Service is broadly defined as anything that does not clearly fall into the categories of *teaching* or *research* (Blackburn & Lawrence, 1995) and includes many forms of student-faculty interaction that extend beyond the classroom and traditional communication over course content. Therefore, advising student groups, meeting with students to discuss their personal and professional development, and mentorship receive less import in the teaching category in terms of impact, and friendly conversations over coffee or dinner are not even regarded as impactful service (Tierney & Bensimon, 1996).

Frequency of Interaction with Students

All faculty must balance service obligations with commitments to research agendas and professional progress; however, current research finds that minority professors carry heavier service loads than their White peers (Allen et al., 2000; Antonio, 2003; Tierney & Bensimon, 1996; Turner & Myers, 2000). Several scholars have referred to this phenomenon as a form of *cultural taxation*, with faculty members from underrepresented groups facing high expectations to participate in diversity-related campus activities in significant ways (Joseph & Hirschfield, 2010; Padilla, 1994; Tierney & Bensimon, 1996). While cultural taxation broadly speaks to service responsibilities, several scholars suggest that these obligations often manifest in expected commitments concerning student contact and mentorship. Historically, both students and administrators were described by Banks (1984) as expecting Black faculty to address Black student problems and concerns as they began to be hired at predominantly White institutions in the 1960s. Today, scholars suggest that students of color continue to seek out minority faculty for advising, support, and guidance on issues related to their personal and professional development (Menges & Exum, 1983; Plata, 1996; Tierney & Bensimon, 1996; Williams & Williams, 2006).

Empirical work has verified the observations made about faculty of color and their high rates of student interaction. An analysis by Umbach (2006) confirms that faculty of color broadly tend to be more likely to interact with students, engaging more often in activities like discussions of career plans, advising, working with student groups, and collaborating on research. In his study of 14,336 faculty at 134 institutions, Umbach found that faculty of color engaged in more active and collaborative learning techniques in the classroom, and African American and Native American faculty more often interacted with students than their White colleagues. Allen and colleagues' (2000) study comparing approximately 1,200 Black and White faculty across six institutions (three public and three private) suggests that Black faculty spend more time engaging undergraduate students outside of the classroom about academics and students' future careers. Williams and Williams's (2006) qualitative study of Black male junior faculty at predominantly White institutions also suggests that faculty of color often spend more time than their peers working closely with students. Participants' narratives suggest that they acknowledge not only their own, but other professors of color's, commitment to mentoring students. Such high commitment, however, is neither shared nor fully appreciated by their colleagues. Joseph and Hirschfield's (2010) study of faculty from a variety of racial/ethnic backgrounds at one Midwestern institution reveals that faculty of color are often asked or expected to mentor students of color, regardless of whether there is an alignment with their research interests. They perceived themselves as *overburdened* and expected to work with students in a more intensive way than their peers.

Interestingly, increased levels of engagement with students may not be consistent across all forms of interaction. According to a work by Eagan and colleagues (2011), there are no statistically significant differences between the rates at which

faculty members from different racial and ethnic groups engage undergraduates in research. Instead, their analysis of over 4,800 faculty responses suggested that institutional type, number of years employed at the institution, disciplinary background, and general patterns of student engagement are more predictive of research-based faculty relationships with undergraduates than racial/ethnic background or gender.

Women are also described as participating in student-faculty interaction at higher rates than their male colleagues (Lindholm, Szelenyi, Hurtado, & Korn, 2005; Park, 1996), and researchers have increasingly explored how gender differences manifest themselves in the extent to which faculty of color interact with students. Although faculty of color are perceived as working closely with students generally, women scholars of color in particular report students, faculty, and administrators expecting them to be *caretakers* for the academic community by serving in supportive roles (Aguirre, 2000; Gregory, 2001; McKay, 1997). Studies of how race and gender intersect to shape the ways in which faculty interact with students have been limited, with most of the extant work focusing on Black faculty. Griffin and Reddick (2011) found that Black professors across three institutions all report high levels of contact with students; however, there were gender differences in expectations and the nature of their engagement. Black males described student-faculty interactions as less personal and more academically focused, and were partially shaped by concerns about how racism and stereotypes of Black men being aggressive and violent translated into their relationships. Black women more often integrated the personal and professional aspects in their interactions; however, some shared that they felt they were expected to have these personal relationships and interactions in ways their male colleagues were not.

Outcomes Associated with Student-Faculty Interaction

Traditional mentoring relationships, as described by Ensher and Murphy (2005), are when an older, wiser individual takes a younger individual under her or his wing, sharing information with and developing the skills of the *mentee*, facilitating professional growth and advancement. Within this model, attention is focused explicitly on the mentee, with the benefits of mentoring being only for the mentee and coming at the expense of faculty time and energy (Ensher & Murphy). It may be especially challenging to conceptualize relationships between professors and students as something from which faculty could benefit, particularly considering that they are expected to engage students outside of the classroom and have advising responsibilities (e.g., course selection, ensure completion of degree requirements).

Despite traditional notions of mentoring and student-faculty interaction, Johnson and colleagues (2010) suggest that increased attention to the faculty experience is warranted. They note that increased attention to the faculty experience and outcomes speaks to the importance of understanding the quality and scope of mentoring relationships, as well as why faculty engage students in ways that go beyond expectations associated with advising or their job responsibilities. Further, research, particularly

in the field of business and management, indicates that while there are drawbacks, mentors have the potential to gain a great deal personally and professionally from engaging in these interactions (Allen, Lentz, & Day, 2006; Allen et al., 1997; Gibb, 1999; Kram, 1988; Ragins & Scandura, 1999). Based on Kram's mentoring framework, presented below are career-related and psychosocial outcomes associated with student-faculty interaction, particularly for faculty of color.

Career Outcomes: Productivity, Tenure, and Promotion

When discussed in relation to faculty careers, student-faculty interaction is most often framed in a negative light, largely because of the negligible consideration of student contact and outreach in the tenure and promotion process. Service is expected from all faculty to some extent; however, it is often not rewarded or considered seriously in the tenure process (Tierney & Bensimon, 1996; Williams & Williams, 2006). Over time, tenure and promotion decisions have come to rely primarily on excellence in research, making participation in committee work, teaching, and advising unhelpful for professors seeking career advancement (Blackwell, 1988; Tierney & Bensimon, 1996; Zusman, 1999). Tierney and Bensimon's work describes the tenure process at large research universities as being driven primarily by research productivity. While they acknowledge that some attention is given to teaching, there is little to no consideration of a professor's commitment to institutional service.

A commitment to service is perhaps most problematic not because it receives limited consideration in the tenure and advancement process; rather, research suggests that the time that service draws from research proves the most challenging. Antonio's (2002) quantitative analysis of a national sample of faculty participating in the 1995 Higher Education Research Institute Faculty Survey suggests that while faculty of color are often committed to and interested in their research, their engagement in teaching and service activities limits their research productivity.

Several researchers have found that time spent teaching or engaging in service activities is related to lower rates of faculty productivity (Bellas & Toutkoushian, 1999; Creamer, 1998; Sutor, Mecom, & Feld, 2001). For example, an analysis of data collected through the 1993 administration of the National Survey of Postsecondary Faculty by Bellas and Toutkoushian (1999) explored the factors and forces related to faculty productivity. They note that while White faculty spent more time engaged in paid work and research, faculty of color worked more often on unpaid activities, which was perceived as problematic in that faculty of color were less likely to produce results of value in the tenure and promotion process. This finding is consistent with arguments in the literature which suggest that requests from students for help and guidance, coupled with personal interests and commitments to institutional service, often draw the attention of minority professors away from their scholarship (Baez, 2000; Banks, 1984; Laden & Hagedorn, 2000; Tierney & Bensimon, 1996).

Increased time spent on teaching or service often means that a professor would have less time committed to research and, as such, would be less productive. As noted above, faculty of color are asked to engage in these activities in ways their White colleagues are not, and this may certainly translate to some of the gaps in productivity we observe between faculty of color and their colleagues (Bellas & Toutkoushian, 1999; Creamer, 1998; Padilla, 1994; Sutor et al., 2001; Tierney & Bensimon, 1996). However, it is important to note that the specific link between increased rates of service and lower rates of productivity observed among faculty of color as compared to White colleagues has not been established empirically, and this should certainly be the focus of future study.

Some scholarship also suggests the interactions between students and faculty of color that take place in the classroom can have negative professional implications. Though limited, the extant literature, largely based on qualitative studies and analyses of faculty narratives, highlights the barriers faculty of color face in the classroom, including questions about their competency and academic knowledge, challenges to their authority, expectations of them being especially funny and/or entertaining, or expectations of representing the experience of people of color in America (e.g., McGowan, 2000; Stanley, 2006; Stanley, Porter, Simpson, & Ouellett, 2003; Tuitt, Hanna, Martinez, Salazar, & Griffin, 2009; Turner & Myers, 2000). Asian and Latino faculty particularly note that their accents can be perceived as incomprehensible by students, whether or not this is actually the case (Turner & Myers, 2000). Black female faculty are also often expected to be warm and caretaking and are punished more severely with poor evaluations and resistance when they do not fulfill students' expectations (Chesler & Young, 2007; Harley, 2008; Harlow, 2003; Hirshfield & Joseph, 2012). These experiences can have real implications on faculty professional achievements and success, often through students' tendency to give faculty of color lower scores on teaching evaluations, which can reflect poorly as faculty are considered for tenure and promotion (Stanley, 2006).

In addition to examining the potentially negative career outcomes associated with high rates of student interaction that are hostile or challenging, it is also important to consider whether there are potential ways in which student-faculty interaction can foster the career outcomes of professors of color. Work by Griffin (2008, 2012a) aligns with the general argument that student-faculty interaction can be reciprocal and mutually beneficial, enhancing the outcomes of faculty of color. Narratives from Black faculty across two research universities suggest that there can be reciprocity in student-faculty interactions. Students generally, and students of color specifically, can positively influence faculty productivity through productive interactions, where the focus is on the creation of a joint resource that benefits all engaged in the relationship. In particular, collaboration on research held great promise not only to provide students with opportunities for professional preparation, but also to enable faculty to gain access to students' new ideas, knowledge of current literature, and enthusiasm and work ethic. Further, for professors who largely worked on issues of race and equity, students of color provided unique insights which were perceived to improve the quality of their work. Scholarly disciplines, departments, and programs that operate based on a collaborative, research laboratory model

(e.g., the biological sciences, psychology, and engineering) may find this form of collaboration easier to engage in (Eagan et al., 2011). However, Griffin's research on Black faculty suggests there is potential for student-faculty interaction to positively influence faculty career outcomes through contributing to research and scholarly productivity.

Psychosocial Outcomes

While researchers in higher education have largely focused on faculty career outcomes associated with student-faculty interaction, the larger mentoring literature, particularly in business, often addresses the psychosocial outcomes associated with developmental relationships for the senior members. In terms of negative personal outcomes, multiple researchers have found that student-faculty interaction takes up a great deal of faculty members' time (i.e., Aguirre, 2000; Banks, 1984; Tierney & Bensimon, 1996), leaving them less time to engage in other activities and pushing them toward less balanced work lives. In addition to acknowledging mentoring is time-consuming, Allen et al. (1997) note developmental relationships can be costly because mentees can abuse the relationship, or mentors may feel they failed their mentees, or mentors can be accused of engaging in favoritism when making decisions concerning their mentees. Ragins and Scandura (1999) found that mentors who perceived their relationships with mentees as costly were less likely to express interest in mentoring in the future.

While initiated in business, this work has relevance for faculty experiences generally, and specifically for faculty of color. More advising responsibilities negatively influence faculty satisfaction, which predicts their intent to leave the academy (Rosser, 2004). This may be particularly salient for faculty of color, who often spend more time interacting with students, mentoring, and participating in developmental relationships with students than their colleagues (Menges & Exum, 1983; Tierney & Bensimon, 1996; Umbach, 2006; Williams & Williams, 2006), thus exposing them to more risk in this regard. Qualitative work by Griffin (2008; Griffin & Reddick, 2011) suggests that Black faculty generally, and Black female faculty in particular, may find their relationships with students time-consuming and emotionally exhausting, taking both an emotional and physical toll over time.

While these findings paint a somewhat negative picture of the potential personal outcomes, student-faculty interactions are often not perceived as wholly negative. In response to the question, "why are mentors prepared to be pro-social and virtuous, and to sacrifice their time and their energies in order to support and assist others for no apparent tangible rewards?" (1999, p. 1062), Gibb responds that, to some extent, individuals mentor because they receive benefits from these interactions, such as being part of a highly visible program their company values. Allen et al. (1997) engaged in qualitative interviews with 27 mentors in five different business organizations, inquiring about their experiences in mentoring relationships. Mentors reported gaining benefits such as close relationships and friendships, organizational recognition, the loyalty of their mentees, and a more competent workforce. Surveys collected from

high-ranking managers and executives indicate that those who have been mentors or mentees in the past are more likely to perceive mentorship as personally rewarding and providing them with a loyal base of support than those without previous experience who were more likely to view mentoring as not worth their time.

There is also research suggesting that some mentors see their mentee's development and growth as a personal benefit (Allen et al., 1997; Ragins & Scandura, 1999). This phenomenon is referred to as *relationship spillover* by Ragins and Scandura and may be particularly salient for faculty of color and the benefits they identify as associated with interacting with students. Faculty of color often articulate a special commitment to race-related service and want to contribute to the advancement of their communities through their work. For example, even though relationships with students were perceived as tiring and time-consuming at times, Black faculty participating in Griffin's (2008, *in press*), Reddick's (2005), and Williams and Williams (2006) studies also communicate a special relationship with their Black students and a desire to see them succeed and contribute to their development. Reddick (2005) found that African American professors at one selective private research institution felt a special connection to their African American students because of their shared experiences and reported learning and feeling a sense of satisfaction from mentoring Black students. Similarly, a professor participating in Griffin's (2008) study explained that while these relationships were time-consuming and distracting, his commitment to developing young scholars of color continued to motivate his engagement in these relationships, and he could not imagine being a professor without these interactions.

Race-related service activities, which can include working directly with students of color, can also provide avenues for faculty of color to make connections across campus, providing a sense of community and network of support for those who feel isolated (Baez, 2000; Stanley, 2006). Just like students, the isolation of faculty of color in predominantly White institutions may enhance the need for these individuals to make connections and find support systems. In a thought piece for *Academe*, antonio (2003) reminds us that we have not really developed an understanding of how diverse undergraduate communities can affect the retention and success of faculty of color. antonio makes four propositions about the relationship between diversity in the student body and diversity in the faculty; one of these propositions speaks specifically to student-faculty interaction. antonio notes that a diverse student body has the potential to diminish isolation for minority faculty, contributing to a positive campus climate and reinforcing perceptions that diversity is valued by the institution.

While the age difference and desire to maintain a professional distance may limit the level of interaction that African American faculty can have in social events, it would be worthwhile to assess how the interactions faculty of color may have with students within the context of community cultural events and celebrations might contribute to their sense of belonging at predominantly White institutions. For example, Butner, Burley and Marbley (2000) noted that Black faculty at predominantly White institutions may feel that it is particularly important to stay connected to their community and engage in African American cultural and social activities. Further, Baez (2000) found that professors of color perceived personal benefits of

forming informal and mentoring relationships with students of color. They offered professors a cultural outlet and created opportunities for them to find interpersonal support for the challenges they face at predominantly White campuses. Thus, encouraging engagement in these activities may reduce the isolation felt by faculty of color, facilitating greater faculty satisfaction and success (Antonio, 2003; Baez, 2000; Hearn, 1997), and should be explored further in future research.

Future Directions in Research

Overall, the number of rigorous empirical studies that examine the conditional effects of student-faculty interaction for diverse students is still small. These studies suggest that the frequency of interactions with faculty must be understood in the context of the quality that defines and characterizes these interactions. In other words, frequent interactions with faculty do not necessarily translate into positive student outcomes. For example, frequent but unfavorable interactions with faculty due to complex and intense interracial interactions may reinforce a campus climate of existing discrimination and ultimately disserve students of color and, in the end, all students.

Two gaps exist in the current literature that examines student-faculty interactions. First, despite the criticism against Tinto's (1993) theory for conceptualizing integration as little more than minority students' cultural assimilation (Tierney, 1997, 1999), Tinto's model has continually guided most of the college impact studies on student-faculty interactions for students of color. As a consequence, the understanding of the conditional effects on student-faculty interaction remains underdeveloped both theoretically and empirically. Increasing knowledge of these theoretical and empirical understandings will not only add to the growing theoretical literature on student-faculty interaction but also spur more informed decisions concerning students' academic success, especially for historically disadvantaged students such as ethnic minority, women, and first-generation students.

Second, dichotomies such as minority versus nonminority and White versus Black still dominate the research literature when examining the differential effects of student-faculty interactions (Cole, 2010a, 2010b). The majority of studies we reviewed highlights the experiences of students of color generally or Black students specifically; much less is known about Native American, Latino, or Native American students and the extent and ways in which they experience student-faculty interaction. There may be cultural differences in expectations and motivating factors for different racial/ethnic groups. As college campuses become increasingly diverse, additional studies that explore and focus on investigations of each group are warranted, in order to examine the specific interactions with faculty across racial/ethnic groups and how these interactions directly and indirectly affect students' educational success.

Higher education researchers must also develop new ways to study student-faculty interactions that take context into account and examine how the outcomes vary across

environments. Context can influence both how and how often students and faculty members interact with one another. For example, previous scholarship has asserted that differences in institutional mission and faculty expectations lead to lower rates of interaction between faculty and students at research universities as compared to liberal arts institutions (Boyer, 1990; Keohane, 2001; Pascarella, Wolniak, Cruce, & Blaich, 2004) and historically Black colleges and universities (Allen, 1992; Fleming, 1984; Griffin, 2008; Johnson & Harvey, 2002; Seifert, Drummond, & Pascarella, 2006). Further, Hispanic-serving institutions (HSIs) have become an important point of access for many Latino, low-income, and/or first-generation college students. HSIs are only 9% of all institutions in higher education yet serve 54% of all Latino college students (HACU, 2012). As these institutions continue to experience rapid growth, more work must be done to gain a better understanding of how and to what effect faculty and students are interacting in HSIs.

Furthermore, it is also important to examine whether the environment created at the institution, regardless of type, impacts student-faculty relationships. While only addressed to a limited extent in the literature, it is possible that campus racial climate is related to the amount of time faculty members spend with students. Described as being a means for understanding the influence of environmental context, campus racial climate is defined as the attitudes, perceptions, and expectations within an institutional community around issues of race, ethnicity, and diversity (Hurtado et al., 1999). Climate has been found to have significant effects on students' and professors' development, college experiences, and success (e.g., Aguirre, 2000; Blackwell, 1988; Cabrera, Nora, Terenzini, Pascarella, & Hagerdorn, 1999; Hendricks & Caplow, 1998; Hurtado et al., 1999); yet there is a lack of understanding of how the specific dimensions of campus racial climate, as well as overall assessments of climate, can shape the interactions that students of color have with faculty, or faculty of color have with students. Multiple studies and thought pieces indicate that students of color seek out minority faculty for support when navigating the challenging predominantly White environments (Banks, 1984; Blackwell, 1988; McKay, 1997; Menges & Exum, 1983; Plata, 1996; Tan, 1995; Tierney & Bensimon, 1996; Williams & Williams, 2006); thus, it could be expected that a more uncomfortable climate would result in more interactions where students seek psychosocial support from faculty members.

Further, few studies have considered how faculty respond to a hostile climate, particularly in terms of their agency and decisions to engage with students. Antonio (2003) suggests that students can be important allies as institutional leaders seek to support faculty of color, arguing that they may be able to mitigate some of the isolation faculty of color feel and contribute to a more positive campus environment and racial climate. It remains an underexplored area, as work by Griffin (2008) indicates Black professors who perceive their campus climate as more hostile tend to spend more time working with students than those who do not. However, more work must be done in this area, exploring whether and how faculty motivations to form and experiences within their relationships differ when in a more hostile campus environment.

Scholars and researchers must also look beyond institutional differences to gain a deeper understanding of the influence and importance of student-faculty interaction

in different contexts. For example, early work by Gamson (1967) and Vreeland and Bidwell (1966) presented disciplinary differences in faculty interest and actual engagement in student interaction outside of the classroom. These scholars found that math and science professors were less interested or likely to work with students outside of the classroom than their colleagues in other disciplines. As scholars continue to explore the forces and factors related to increasing diversity, the work currently being done on how student-faculty interaction within the sciences may be distinctive in terms of frequency, form, and influence (e.g., Hurtado et al., 2011) should be extended to other fields. Other academic fields should also be carefully considered as important differences across multiple academic fields may be noteworthy. We encourage the National Institutes of Health (NIH) and National Science Foundation (NSF) to continue to invest in the scholarship on students and faculty engaged in research and for other professions and disciplines to establish similar programs of research.

Finally, as higher education researchers continue to pursue deeper understandings of the influence of student-faculty interactions, greater efforts must be made to distinguish different types of interactions from one another. Scholars have increasingly attempted to assess not only whether or how much faculty interaction influences student outcomes but also whether certain types of interactions influence students and faculty in different ways. For example, are the outcomes associated with engaging a student in research-related activity distinctive from interacting with a faculty member advising a student group, or when a faculty member is supporting a student through an emotional challenge? We encourage researchers to go beyond understanding the differences between *mentoring* and *advising*, or articulating the benefits associated with spending more or less time participating in student-faculty interaction in a given week. Rather we recognize that relationships are composed of multiple interactions of different form and motivation, which may ultimately have very different effects on faculty and student. Thus, we note the importance of and support a shift toward a focus on specific behaviors or *developmental interactions* (D'Abate et al., 2003), which represent both brief and long-term interactions between faculty and students.

Conclusion

In the documentary *Declining by Degrees*, there is a scene where the unspoken *contract* between students and faculty was discussed; that is, if faculty *don't* push students so hard and *don't* ask too much of them, students will leave faculty alone and *won't* bother them too much in or outside of the classroom. As faculty are pushed more and more to produce research and generate grant dollars, it becomes all too easy to forget the important learning and development outcomes, which results when faculty and students engage in multiple contexts. With the increased use of technology to communicate and facilitate the learning process online, it is easier for students to disengage, and not interact meaningfully or develop close relationships with faculty.

This review of literature is a reminder that such trends can be detrimental and why institutional actions must be taken to encourage students and faculty members to engage outside of the classroom. As college campuses become more diverse, it is important to understand the impact that interactions with faculty have on students from different groups, as well as encourage students and faculty to engage in ways that produce the most positive academic and psychosocial outcomes students can experience during their college years. Further, this literature suggests a means for institutional leaders to develop structures, which allow faculty to engage with students in ways that are professionally beneficial rather than costly—to develop reward structures that reinforce what the research supports—that there is real value in the interactions between students and faculty.

References

- Adams, H. G. (1992). *Mentoring: An essential factor in the doctoral process for minority students* (Report No. HE 026–497) Notre Dame, IN: National Consortium for Graduate degrees. (ERIC Document Reproduction Service No. ED 358 769)
- Aguirre, A., Jr. (2000). In A. Kezar (Ed.), *Women and minority faculty in the academic workplace: Recruitment, retention, and academic culture*. Washington, DC: ASHE-ERIC Higher Education Report.
- Allen, T. D., Lentz, E., & Day, R. (2006). Career success outcomes associated with mentoring others: A comparison of mentors and nonmentors. *Journal of Career Development*, 32(3), 272–285.
- Allen, T. D., Poteet, M. L., & Burroughs, S. M. (1997). The mentor's perspective: A qualitative inquiry and future research agenda. *Journal of Vocational Behavior*, 51, 70–89.
- Allen, W. R. (1992). The color of success: African American college student outcomes at predominantly White and historically Black public colleges and universities. *Harvard Educational Review*, 62(1), 26–44.
- Allen, W. R., Epps, E. G., Guillery, E. A., Suh, S. A., & Bonous-Hammarth, M. (2000). The Black academic: Faculty status among African Americans in us higher education. *The Journal of Negro Education*, 69, 112–127.
- Allen, W. R., Epps, E. G., & Haniff, N. Z. (Eds.). (1991). *College in black and white: African American students in predominantly White and in historically Black public universities*. Albany, NY: State University of New York Press.
- Anaya, G., & Cole, D. (2001). Latina/o student achievement: Exploring the influence of student-faculty interaction on college grades. *Journal of College Student Development*, 42(1), 3–14.
- Antonio, A. L. (2002). Faculty of color reconsidered: Reassessing contributions to scholarship. *Journal of Higher Education*, 75(5), 582–602.
- Antonio, A. L. (2003). Diverse student bodies, diverse faculties. *Academe* Retrieved December 20, 2004, from <http://www.aaup.org/publications/Academe/2003/03nd/03ndanto.htm>
- Antony, J. S., & Taylor, E. (2004). Theories and strategies of academic career socialization: Improving paths to the professoriate for black graduate students. In D. H. Wulff & A. E. Austin (Eds.), *Paths to the professoriate: Strategies for enriching the preparation of future faculty* (pp. 92–114). San Francisco: Jossey-Bass.
- Arum, R., & Roksa, J. (2011). *Academically adrift: Limited learning on college campuses*. Chicago: The University of Chicago Press.
- Astin, A. (1993). *What matters in college?: Four critical years revisited*. San Francisco: Jossey-Bass Publishers.
- Astin, A. (1995). How educational excellence is defined. In *Achieving educational excellence* (pp. 1–23). San Francisco: Jossey-Bass.

- Astin, A. (1997). *Four critical years: Effects of college beliefs, attitudes, and knowledge*. San Francisco: Jossey-Bass.
- Austin, A. E. (2002). Preparing the next generation of faculty: Graduate school as socialization to the academic career. *Journal of Higher Education*, 73(1), 94–122.
- Austin, A. E., & McDaniel, M. (2006). Preparing the professoriate of the future: Graduate student socialization for faculty roles. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. XXI, pp. 397–456). New York: Springer.
- Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Student Personnel*, 22, 297–308.
- Ayres, O. W., & Bennett, R. W. (1983). University characteristics and student achievement. *Journal of Higher Education*, 54, 516–532.
- Baez, B. (2000). Race-related service and faculty of color: Conceptualizing critical agency in academe. *Higher Education*, 39, 363–391.
- Baird, L. L. (1995). Helping graduate students: A graduate adviser's view. In A. S. Pruitt-Logan & P. D. Isaac (Eds.), *Student services for the changing graduate student population* (New directions for student services, 72, pp. 25–32). San Francisco: Jossey-Bass.
- Baker, V., & Griffin, K. A. (2010). Beyond mentoring and advising: Toward understanding the role of faculty “developers” in student success. *About Campus*, 14(6), 2–8.
- Bandura, A. (1969). Social-learning theory of identificatory processes. In D. A. Goslin (Ed.), *Handbook of socialization theory and research* (pp. 213–262). Chicago: Rand McNally & Company.
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Banks, W. M. (1984). Afro-American scholars in the university. *American Behavioral Scientist*, 27(3), 325–338.
- Barnes, B. J., & Austin, A. E. (2009). The role of doctoral advisors: A look at advising from the advisor's perspective. *Innovative Higher Education*, 33(5), 297–315.
- Barnett, E. A. (2010). Validation experiences and persistence among community college students. *The Review of Higher Education*, 34(2), 193–230.
- Bean, J. P., & Kuh, G. D. (1984). The relationship between student-faculty interaction and undergraduate grade point average. *Research in Higher Education*, 21, 461–477.
- Belcher, D. (1994). The apprenticeship approach to advanced academic literacy: Graduate students and their mentors. *English for Specific Purposes*, 13(1), 23–34.
- Bellas, M. L., & Toutkoushian, R. K. (1999). Faculty time allocations and research productivity: Gender, race, and family effects. *The Review of Higher Education*, 22(4), 367–390.
- Bensimon, E. M. (2007). The underestimated significance of practitioner knowledge in the scholarship on student success. *The Review of Higher Education*, 30(4), 441–469.
- Berger, J. B., & Milem, J. F. (2000). Exploring the impact of historically Black colleges in promoting the development of undergraduates' self concept. *Journal of College Student Development*, 41, 381–394.
- Birnbaum, R. (1988). *How colleges work: The cybernetics of academic organization and leadership*. San Francisco: Jossey-Bass.
- Blackburn, R. T., & Lawrence, J. H. (1995). *Faculty at work: Motivation, expectation, satisfaction*. Baltimore, MD: The Johns Hopkins University Press.
- Blackwell, J. E. (1988). Faculty issues: The impact on minorities. *The Review of Higher Education*, 11(4), 417–434.
- Blake-Beard, S., Bayne, M., Crosby, F., & Muller, C. (2011). Matching by race and gender in mentoring relationships: Keeping our eyes on the prize. *Journal of Social Issues*, 67(3), 622–643.
- Bollen, K. A. (1989). *Structural equations with latent variables*. New York: Wiley.
- Bollen, K. A., & Hoyle, R. (1990). Perceived cohesion: A conceptual and empirical examination. *Social Forces*, 69(2), 479–504.
- Bonous-Hammarth, M. (2000). Pathways to success: Affirming opportunities for science, mathematics, and engineering majors. *The Journal of Negro Education*, 69(1–2), 92–111.
- Borglum, K., & Kubala, T. (2000). Academic and social integration of community college students: A case study. *Community College Journal of Research and Practice*, 24, 567–576.

- Bowen, H. R. (1997). *Investment in learning: The individual and social value of American higher education*. Baltimore, MD: Johns Hopkins University Press.
- Bowman, S. R., Kite, M. E., Branscombe, N. R., & Williams, S. (1999). Developmental relationships of Black Americans in the academy. In A. J. Murrell, F. J. Crosby, & R. J. Ely (Eds.), *Mentoring dilemmas: Developmental relationships within multicultural organizations* (pp. 21–46). Mahwah, NJ: Lawrence Erlbaum Associates.
- Boyer, E. L. (1990). *Scholarship reconsidered: Priorities of the professoriate*. Princeton, NJ: Carnegie Foundation.
- Bragg, A. K. (1976). *The socialization process in higher education*. Washington, DC: American Association for Higher Education.
- Braxton, J. M., & McClendon, S. A. (2001–2002). The fostering of social integration and retention through institutional practice. *Journal of College Student Retention: Research, Theory & Practice*, 3(1), 57–71.
- Braxton, J. M., Milem, J. F., & Sullivan, A. S. (2000). The influence of active learning on the college student departure process: Towards a revision of Tinto's theory. *Journal of Higher Education*, 71(5), 569–590.
- Brown, L., & Robinson Kurpius, S. (1997). Psychosocial factors influencing academic persistence of American Indian college students. *Journal of College Student Development*, 38, 3–12.
- Brown, M. C., Davis, G. L., & McClendon, S. A. (1999). Mentoring graduate students of color: Myths, models, and modes. *Peabody Journal of Education*, 74(2), 105–118.
- Burrell, L. F. (1980). Is there a future for black students on predominantly white campuses? *Integrated Education*, 18, 23–27.
- Butner, B., Burley, H., & Marbley, A. F. (2000). Coping with the unexpected: Black faculty at predominantly White institutions. *Journal of Black Studies*, 30(3), 453–462.
- Cabrera, A., Nora, A., Terenzini, P., Pascarella, E. T., & Hagerdorn, L. S. (1999). Campus racial climate and the adjustment of students to college: A comparison between White students and African American students. *Journal of Higher Education*, 70(2), 134–160.
- Cameron, S. W., & Blackburn, R. T. (1981). Sponsorship and academic career success. *Journal of Higher Education*, 52(4), 369–377.
- Carden, A. D. (1990). Mentoring and adult career development: The evolution of a theory. *The Counseling Psychologist*, 18(2), 275–299.
- Carlone, H. B., & Johnson, A. (2007). Understanding the science experiences of successful women of color: Science identity as an analytic lens. *Journal of Research in Science Teaching*, 44(8), 1187–1218.
- Chang, J. C. (2005). Student-faculty interaction at the community college: A focus on students of color. *Research in Higher Education*, 46(7), 769–802.
- Chapman, D. W., & Pascarella, E. T. (1983). Predictors of academic and social integration of college students. *Research in Higher Education*, 19(3), 295–322.
- Chemers, M. M., Zurbriggen, E. L., Syed, M., Goza, B. K., & Bearman, S. (2011). The role of efficacy and identity in science career commitment among underrepresented minority students. *Journal of Social Issues*, 67(3), 469–491.
- Chesler, M., & Young, A. A. (2007). Faculty members' social identities and classroom authority. *New Directions For Teaching and Learning*, 111, 11–19.
- Chickering, A. (1969). *Education and identity*. San Francisco: Jossey-Bass.
- Chickering, A. W., & Reisser, L. (1993). *Education and identity* (2nd ed.). San Francisco: Jossey-Bass.
- Cokley, K. (2000). Perceived Faculty Encouragement and Its Influence on College Students. *Journal of College Student Development*, 41(3), 348–52.
- Cokley, K. (2002). The impact of college racial composition on African American students' academic self-concept: A replication and extension. *The Journal of Negro Education*, 71, 288–296.
- Colbeck, C. L., Cabrera, A. F., & Terenzini, P. T. (2001). Learning professional confidence: Linking teaching practices, students' self-perceptions, and gender. *The Review of Higher Education*, 24(2), 173–191.

- Cole, D. G. (1999). *Student-faculty interactions of African American and White college students at predominantly White institutions*. Unpublished doctoral dissertation, Indiana University, Bloomington, IL.
- Cole, D. G., Sugioka, H. L., & Yamagata-Lynch, L. C. (1999). Supportive classroom environments for creativity in higher education. *The Journal of Creative Behavior*, 33(4), 277–293.
- Cole, D. G. (2004, November). *Minority students' faculty contact and the impact on their GPA*. Paper presented at the annual meeting of the Association for the Study of Higher Education, Kansas City, MO.
- Cole, D. G. (2007). Do interracial interactions Matter? An examination of student-faculty contact and intellectual self-concept. *Journal of Higher Education*, 78(3), 249–281.
- Cole, D. G. (2008). Constructive criticism: The role of student-faculty interactions on African American and Hispanic students' educational gains. *Journal of College Student Development*, 49(6), 587–605.
- Cole, D. G. (2010a). The role of faculty contact on minority students' educational gains. *Journal of the Professoriate*, 3(2), 1–16.
- Cole, D. G. (2010b). The effects of student-faculty interactions on minority students' college grades: Differences between aggregated and disaggregated data. *Journal of the Professoriate*, 3(2), 137–160.
- Cole, D. G., Bennett, C., & Thompson, J. (2003). Teacher education in a collaborative multicultural classroom: Implications for critical-mass-minority and all-minority classes at a predominantly White University. *Journal of Classroom Interaction*, 38(1), 17–28.
- Cole, D. (2011). Debunking anti-intellectualism: An examination of African American students' intellectual self-concept. *The Review of Higher Education*, 34(2), 259–282.
- Cole, D., & DeAngelo, L. (Ed.). (2010). Students of color and their interactions with faculty. *Journal of the Professoriate*. <http://jotp.icbche.org/>
- Cole, D., & Espinoza, A. (2008). Improving the academic performance of Latinos in STEM majors. *Journal of College Student Development*, 49(4), 285–300.
- Cole, D., & Jackson, J. (2005). Racial integration in higher education and students' educational satisfaction 50 years beyond Brown. In C. Edley Jr. & D. N. Byrne (Eds.), *Brown v. Board of Education: Its impact on public education* (pp. 1954–2004). New York: Thurgood Marshall Scholarship Fund.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *The American Journal of Sociology*, 94(Supplement), S95–S120.
- Cotton, S. R., & Wilson, B. (2006). Student-faculty interactions: Dynamics and determinants. *Higher Education*, 51, 487–519.
- Cox, B. E., & Orehovec, E. (2007). Faculty-student interaction outside the classroom: A typology from a residential college. *The Review of Higher Education*, 30(4), 343–362.
- Cox, M. I., Terenzini, R., & Quaye. (2010). Pedagogical signals of faculty approachability: Factors shaping faculty-student interaction outside the classroom. *Research in Higher Education*, 51(8), 767–788.
- Creamer, E. G. (1998). *Assessing faculty publication productivity: Issues of equity* (ASHE-ERIC higher education report, Vol. 26). Washington, DC: The George Washington University, Graduate School of Education and Human Development.
- Crisp, G., & Cruz, I. (2009). Mentoring college students: A critical review of the literature between 1990 and 2007. *Research In Higher Education*, 50(6), 525–545. doi:10.1007/s11162-009-9130-2.
- D'Abate, C., Eddy, E. R., & Tannenbaum, S. I. (2003). What's in a name? A literature-based approach to understanding mentoring, coaching, and other constructs that describe developmental interactions. *Human Resource Development Review*, 2(4), 360–384.
- Daniel, C. (2007). Outsiders-within: Critical race theory, graduate education and barriers to professionalization. *J. Soc. & Soc. Welfare*, 34 (1), 25–42.
- Darden, J. T., Kamel, S. M., & Jacobs, A. J. (1998). Black faculty in predominantly White U.S. Institutions of higher education: The influence of Black student enrollment. *Equity and Excellence in Education*, 31(2), 6–18.

- Davis, R. B. (1991). Social support networks and undergraduate student academic–success related outcomes: A comparison of Black students on Black and White campuses. In W. R. Allen, E. G. Epps, & N. Z. Haniff (Eds.), *College in Black and White: African American students in predominantly White and in historically Black public universities* (pp. 147–153). Albany, NY: State University Press of New York Press.
- Davis, J. E. (1994). College in Black and White: Campus environment and academic achievement of African American males. *The Journal of Negro Education*, 63, 620–633.
- Dayton, B., Gonzalez–Vasquez, N., Martinez, C. R., & Plum, C. (2004). Hispanic-serving institutions through the eyes of students and administrators. In A. M. Ortiz (Ed.), *Addressing the unique needs of Latino American students. New directions for student services* (Vol. 105, pp. 29–40). San Francisco: Jossey Bass.
- Dixon-Reeves, R. (2003). Mentoring as a precursor to incorporation: An assessment of the mentoring experience of recently minted Ph.D.s. *Journal of Black Studies*, 34(1), 12–27.
- Dugan, J. P., & Komives, S. R. (2010). Influences on college students' capacities for socially responsible leadership. *Journal of College Student Development*, 51(5), 525–549. doi:[10.1353/csd.2010.0009](https://doi.org/10.1353/csd.2010.0009).
- Eagan, M. K., Sharkness, J., Hurtado, S., Mosqueda, C. M., & Chang, M. J. (2011). Engaging undergraduate in science research: Not just about faculty willingness. *Research In Higher Education*, 52(2), 151–177.
- Eby, L., & Allen, T. D. (2002). Further investigation of protégés' negative mentoring experiences. *Group and Organization Management*, 27(4), 456–479.
- Eby, L., Butts, M., Lockwood, A., & Simon, S. A. (2004). Protégés' negative mentoring experiences: Construct development and nomological validation. *Personnel Psychology*, 57, 411–447.
- Eby, L. E., McManus, S. E., Simon, S. A., & Russell, J. E. A. (2000). The Protégé's perspective regarding negative mentoring experiences: The development of a taxonomy. *Journal of Vocational Behavior*, 57, 1–21.
- Eddy, E. (1959). *The college influence on student character*. Washington, DC: American Council for Education.
- Einarson, M. K., & Clarkberg, M. E. (2004). *Understanding faculty out-of-class interaction with undergraduate students at a research university*. Paper presented at the Association for the Study of Higher Education, Kansas City, MO.
- Emerson, R. M. (1981). Social exchange theory. In M. Rosenberg & R. H. Turner (Eds.), *Social psychology: Sociological perspectives* (pp. 30–65). New York: Basic Books, Inc.
- Endo, J., & Harpel, R. (1982). The effect of student-faculty interaction on students' educational outcomes. *Research in Higher Education*, 16(2), 115–138.
- Endo, J., & Harpel, R. (1983). *Student-faculty interaction and its effect on freshman year outcomes at a major state university*. Paper presented at the meeting of the Association for Institutional research, Toronto, ON.
- Ensher, E. A., & Murphy, S. E. (2005). *Power mentoring: How successful mentors and protégés get the most out of the relationships*. San Francisco: Jossey-Bass.
- Ensher, E. A., Thomas, C., & Murphy, S. E. (2001). Comparison of traditional, step-ahead, and peer mentoring on protégés' support, satisfaction, and perceptions of career success: A social exchange perspective. *Journal of Business and Psychology*, 15, 419–438.
- Erekson, O. (1992). Joint determination of college student achievement and effort: Implications for college teaching. *Research in Higher Education*, 33(4), 433–446.
- Erikson, E. H. (1968). *Identity: Youth and crisis*. New York: Norton.
- Fleming, J. (1984). *Blacks in college*. San Francisco: Jossey-Bass.
- Freeman, K. (1999). No services needed? The case for mentoring high-achieving African American students. *Peabody Journal of Education*, 74(2), 15–26.
- Fries-Britt, S. L., & Turner, B. (2001). Facing stereotypes: A case study of Black students on a White campus. *Journal of College Student Development*, 42(5), 420–429.
- Frost, S. H. (1991). Fostering the critical thinking of college women through academic advising and faculty contact. *Journal of College Student Development*, 32, 359–366.

- Gamson, Z. (1967). Utilization and normative orientations toward education. *Sociology of Education*, 39, 46–73.
- Gasiewski, J. A., Eagan, M. K., Garcia, G. A., Hurtado, S., & Chang, M. J. (2012). From gatekeeping to engagement: A multicontextual, mixed method study of student academic engagement in introductory STEM courses? *Research in Higher Education*, 53(2), 229–261.
- Gasman, M., Hirschfield, A., & Vultaggio, J. (2008). “Difficult yet rewarding”: The experiences of African American graduate students. *Journal of Diversity in Higher Education*, 1(2), 126–138.
- Gibb, S. (1999). The usefulness of theory: A case study in evaluating formal mentoring schemes. *Human Relations*, 52(8), 1055–1075.
- Gloria, A. M. (1997). Chicana academic persistence: Creating a university-based community. *Education and Urban Society*, 30(1), 107–121.
- Golde, C. M., & Pribbenow, D. A. (2000). Understanding faculty involvement in residential learning communities. *Journal of College Student Development*, 41(1), 27–40.
- Greene, T., Marti, C., & McClenney, K. (2008). The effort-outcome gap: Differences for African American and Hispanic community college students in student engagement and academic achievement. *Journal of Higher Education*, 79(5), 513–539.
- Gregory, S. T. (2001). Black faculty women in the academy: History, status, and future. *The Journal of Negro Education*, 70(3), 124–138.
- Griffin, K. A. (2008). *Can reaching back push you forward?: A mixed methods exploration of Black faculty and their developmental relationships with students*. Doctoral dissertation. University of California, Los Angeles, Los Angeles, CA.
- Griffin, K. A. (2012a). Black professors managing mentorship: Implications of applying social exchange frameworks to analyses of student interactions and their influence on scholarly productivity. *Teachers College Record*, 114, 1–37.
- Griffin, K. A. (2012b). Learning to mentor: A mixed methods study of the nature and influence of Black professors’ socialization into their roles as mentors. *Journal of the Professoriate*, 6(2), 1–31.
- Griffin, K. A. (in press). Voices of the “Othermothers”: Reconsidering Black professors’ relationships with Black students as a form of social exchange. *The Journal of Negro Education*.
- Griffin, K. A., & Reddick, R. J. (2011). Surveillance and sacrifice: Gender differences in the mentoring and advising patterns of Black professors. *American Educational Research Journal*, 48(5), 1032–1057.
- Guiffida, D. (2006). Toward a cultural advancement of Tinto’s theory. *The Review of Higher Education*, 29(4), 451–472.
- Gurin, P., & Katz, D. (1966). *Motivation and aspiration in the Negro college* (Office of Education, U.S. Department of Health Education and Welfare Project Number 5-0787.) Ann Arbor, MI: University of Michigan Survey Research Center, Institute for Social Research.
- Harley, D. A. (2008). Maids of Academe: African American Women Faculty at Predominantly White Institutions. *Journal of African American Studies*, 12(1), 19–36.
- Harlow, R. (2003). ‘Race doesn’t matter, but....’: The effect of race on professors’ experiences and emotion management in the undergraduate college classroom. *Social Psychology Quarterly*, 66(4), 348–363.
- Hausmann, L. R., Schofield, J. E., & Woods, R. L. (2007). Sense of belonging as a predictor of intentions to persist among African American and White first-year college students. *Research in Higher Education*, 48(7), 803–839.
- Hearn, J. C. (1997). Research on higher education in a mass and diversified system: The case of the United States. In J. Sadlak & P. G. Altbach (Eds.), *Higher education research at the turn of the century: Structures, issues, and trends* (pp. 271–319). New York: UNESCO and Garland Publishing.
- Hendricks, A. D., & Caplow, J. A. (1998, November). *African American faculty perceptions of the academic culture and their professional socialization*. Paper presented at the Association for the Study of Higher Education Annual Meeting, Miami, FL.
- Hernandez, J. C. (2000). Understanding the retention of Latino college students. *Journal of College Student Development*, 41, 575–588.

- Hezlett, S. A., & Gibson, S. K. (2007). Linking mentoring and social capital: Implications for career and organization development. *Advances in Developing Human Resources*, 9(3), 384–412.
- Hill, R. D., Castillo, L. G., Ngu, L. Q., & Pepion, K. (1999). Mentoring ethnic minority students for careers in academia: The WICHE doctoral scholars program. *The Counseling Psychologist*, 27(6), 827–845.
- Hirshfield, L. E., & Joseph, T. D. (2012). ‘We need a woman, we need a black woman’: gender, race, and identity taxation in the academy. *Gender and Education*, 24(2), 213–227.
- Hispanic Association of Colleges and Universities (HACU) (2012). Fact Sheet: Hispanic Higher Education and HSIs. http://www.hacu.net/hacu/hsi_fact_sheet.asp.
- Hoffman, M., Richmond, J., Morrow, J., & Salomone, K. (2002). Investigating sense of belonging in first year college students. *Journal of College Student Retention*, 4(3), 227–256.
- Homans, G. C. (1958). Social behavior as exchange. *The American Journal of Sociology*, 63(6), 597–606.
- Hurtado, S. (1994). The institutional climate for talented Latino students. *Research in Higher Education*, 35(1), 539–569.
- Hurtado, S., Cabrera, N. L., Lin, M. H., Arellano, L., & Espinosa, L. L. (2009). Diversifying science: Underrepresented minority experiences in structured research programs. *Research in Higher Education*, 50(2), 189–214. doi:10.1007/s11162-008-9114-7.
- Hurtado, S., & Carter, D. (1997). Effects of college transition and perceptions of the campus racial climate on Latino college students’ sense of belonging. *Sociology of Education*, 70, 324–345.
- Hurtado, S., Eagan, M. K., Cabrera, N. L., Lin, M. H., Park, J., & Lopez, M. (2008). Training future scientists: Predicting first-year minority participation in health science research. *Research in Higher Education*, 49(2), 126–152.
- Hurtado, S., Eagan, M. K., Tran, M. C., Newman, C. B., Chang, M. J., & Velasco, P. (2011). “We do science here”: Underrepresented students’ interactions with faculty in different college contexts. *Journal of Social Issues*, 67(3), 553–579.
- Hurtado, S., Han, J. C., Saenz, V. B., Espinosa, L. L., Cabrera, N. L., & Cerna, O. S. (2007). Predicting transition and adjustment to college: Biomedical and behavioral science aspirants’ and minority students’ first year of college. *Research in Higher Education*, 48(7), 841–887.
- Hurtado, S., Milem, J., Clayton-Pedersen, A., & Allen, W. R. (1999). In A. Kezar (Ed.), *Enacting diverse learning environments: Improving the climate for racial/ethnic diversity in higher education*. Washington, DC: ASHE–ERIC Higher Education Report.
- Hurtado, S., & Ponjuan, L. (2005). Latino educational outcomes and the campus climate. *Journal of Hispanic Higher Education*, 4(3), 235–251.
- Jackson, A., Smith, S., & Hill, C. (2003). Academic persistence among Native American college students. *Journal of College Student Development*, 44(4), 548–565.
- Jacob, P. (1957). *Changing values in college: An exploratory study of the impact of college teaching*. New York: Harper.
- Jacobi, M. (1991). Mentoring and undergraduate academic success: A literature review. *Review of Educational Research*, 61(4), 505–532.
- Johnson, B. J. (2007). *On being a mentor: A guide for higher education faculty*. New York: Psychology Press/Taylor & Francis.
- Johnson, B. J., & Harvey, W. B. (2002). The socialization of Black college faculty: Implications for policy and practice. *The Review of Higher Education*, 25(3), 297–314.
- Johnson, B. J., Rose, G., & Schlosser, L. Z. (2007). Student–faculty mentoring: Theoretical and methodological issues. In T. D. Allen & L. T. Eby (Eds.), *The Blackwell handbook of mentoring: A multiple perspectives approach* (pp. 49–69). Malden, MA: Wiley–Blackwell.
- Johnson-Bailey, J., Valentine, T., Cervero, R. M., & Bowles, T. A. (2009). Rooted in the soil: The social experiences of Black graduate students at a southern research university. *Journal of Higher Education*, 80(2), 178–203.
- Joseph, T. D., & Hirschfield, L. E. (2010). “Why don’t you get somebody new to do it?” Race and cultural taxation in the academy. *Ethnic and Racial Studies*, 1–21. Retrieved from doi:10.1080/01419870.2010.496489

- Kanter, R. (1977). *Men and women of the corporation*. New York: Basic Books.
- Karunanayake, D., & Nauta, M. M. (2004). The relationship between race and students' identified career role models and perceived role model influence. *The Career Development Quarterly*, 52(3), 225–234.
- Kelly, S., & Schweitzer, J. H. (1999). Mentoring within a graduate school setting. *College Student Journal*, 33, 130–148.
- Keohane, N. O. (Ed.). (2001). *The liberal arts and the role of elite higher education*. Baltimore, MD: Johns Hopkins University Press.
- Kezar, A., & Moriarty, D. (2000). Expanding our understanding of student leadership development: A study exploring gender and ethnic identity. *Journal of College Student Development*, 41, 55–69.
- Kim, M. M. (2004). The experience of African-American students in historically black institutions. *The NEA Higher Education Journal: Thought and Action*, XX(1), 107–124.
- Kim, Y. K. (2010). Racially different patterns of student-faculty interaction in college: A focus on levels, effects, and causal directions. *The Journal of the Professoriate*, 3(2), 160–189.
- Kim, Y., Chang, M., & Park, J. (2009). Engaging with faculty: Examining rates, predictors, and educational effects for Asian American undergraduates. *Journal of Diversity in Higher Education*, 2(4), 206–218.
- Kim, M. K., & Conrad, C. (2006). The impact of historically Black colleges and universities on the academic success of African-American students. *Research in Higher Education*, 47(4), 399–427.
- Kim, Y. K., & Sax, L. J. (2009). Student-faculty interactions in research universities: differences by student gender, race, social class, and first-generation status. *Research in Higher Education*, 50, 437–459.
- Kinthead, J. (2003). Learning through inquiry: An overview of undergraduate research. *New Directions for Teaching and Learning*, 93, 5–17.
- Kirk, D., & Todd-Mancillas, W. R. (1991). Turning points in graduate school socialization: Implications for recruiting future faculty. *The Review of Higher Education*, 14, 407–422.
- Kraft, C. L. (1991). What makes a successful black student on a predominantly White campus. *American Educational Research Journal*, 28(2), 423–443.
- Kram, K. E. (1988). *Mentoring at work: Developmental relationships in organizational life*. New York: University Press of America.
- Kuh, G. D., & Hu, S. (2001). The effects of student-faculty interaction in the 1990s. *The Review of Higher Education*, 24, 309–332.
- Kuh, G. D., & Love, P. G. (2000). A cultural perspective on student departure. In J. Braxton (Ed.), *Reworking the student departure puzzle* (pp. 196–212). Nashville, TN: Vanderbilt University Press.
- Kuh, G. D., Schuh, J., Whitt, E., & Associates. (1991). *Involving colleges: Successful approaches to fostering student learning and development outside the classroom*. San Francisco: Jossey-Bass.
- Kuh, G. D., Vesper, N., Connolly, M. R., & Pace, C. R. (1997). *College student experiences questionnaire: Revised norms for the* (3rd ed.). Bloomington, IN: Center for Postsecondary Research and Planning, Indiana University.
- Laband, D. N., & Lentz, E. (1995). Workplace mentoring in the legal profession. *Southern Economic Journal*, 61, 783–802.
- Lacy, W. (1978). Interpersonal relationships as mediators of structural effects: College student socialization in a traditional and an experimental university environment. *Sociology of Education*, 51, 201–211.
- Laden, B. V., & Hagedorn, L. S. (2000). Job satisfaction among faculty of color in academe: Individual survivors or institutional transformers? *New Directions for Institutional Research*, 105, 57–66.
- Lee, W. Y. (1999). Striving toward effective retention: The effect of race on mentoring African American students. *Peabody Journal of Education*, 74, 27–43.
- Leslie, L. L., McClure, G. T., & Oaxaca, R. L. (1998). Women and minorities in science and engineering: A life sequence analysis. *Journal of Higher Education*, 69(3), 239–276.

- Lindholm, J. A., Szelenyi, K., Hurtado, S., & Korn, W. S. (2005). *The American college teacher: National norms for the 2004–2005 HERI faculty survey*. Los Angeles, CA: Higher Education Research Institute, UCLA.
- Locks, L. M., Hurtado, S., Bowman, N. A., & Oseguera, L. (2007). Extending notions of campus climate and diversity to students' transition to college. *The Review of Higher Education*, 31(3), 257–285.
- Loo, C. M., & Rollison, G. (1986). Alienation of ethnic minority students at a predominantly white university. *Journal of Higher Education*, 57(1), 58–77.
- Lundberg, C. (2007). Student involvement and institutional commitment to diversity as predictors of Native American student learning. *Journal of College Student Development*, 48(4), 405–416.
- Lundberg, C. A., & Schreiner, L. A. (2004). Quality and frequency of student-faculty interaction as predictors of learning: An analysis by student race/ethnicity. *Journal of College Student Development*, 45(5), 549–565. doi:10.1353/csd.2004.0061.
- MacKay, K. A., & Kuh, G. D. (1994). A comparison of student effort and educational gains of Caucasian and African-American students at predominantly White colleges and universities. *Journal of College Student Development*, 35, 217–223.
- Maestas, R., Vaquera, G. S., & Munoz Zehr, L. (2007). Factors impacting sense of belonging at a Hispanic-Serving Institution. *Journal of Hispanic Higher Education*, 6, 237–256.
- Martin Lohfink, M., & Paulsen, M. B. (2005). Comparing the determinants of persistence for first-generation and continuing-generation students. *Journal of College Student Development*, 46(4), 409–428.
- McDowall-Long, K. (2004). Mentoring relationships: Implications for practitioners and suggestions for future research. *Human Resource Development International*, 7(4), 519–534.
- McGowan, J. M. (2000, Winter). African-American faculty classroom teaching experiences in predominantly White colleges and universities. *Multicultural Education*, 8, 19–22.
- McKay, N. Y. (1997). A troubled peace: Black women in the halls of the White academy. In L. Benjamin (Ed.), *Black women in the academy: Promises and perils* (pp. 11–22). Miami, FL: University Press of Florida.
- McPherson, M. S., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 27, 415–444.
- Menges, R. J., & Exum, W. H. (1983). Barriers to the progress of women and minority faculty. *Journal of Higher Education*, 54(2), 123–144.
- Molm, L. D. (2006). The social exchange framework. In P. J. Burke (Ed.), *Contemporary social psychological theories* (pp. 24–45). Stanford, CA: Stanford Social Sciences.
- Mullen, C. A. (2007). Naturally occurring student-faculty mentoring relationships: A literature review. In T. D. Allen & L. T. Eby (Eds.), *The Blackwell handbook of mentoring: A Multiple perspectives approach* (pp. 119–158). Malden, MA: Blackwell Publishing Ltd.
- Museus, S. D., & Quayle, S. J. (2009). Toward an intercultural perspective of racial and ethnic minority college student persistence. *The Review of Higher Education*, 33(1), 67–94.
- Museus, S. D., & Ravello, J. N. (2010). Characteristics of academic advising that contribute to racial and ethnic minority student success at predominantly White institutions. *NACADA Journal*, 30(1), 47–58.
- Nagda, B. A., Gregerman, S. R., Jonides, J., Von Hippel, W., & Lerner, J. S. (1998). Undergraduate student-faculty research partnerships affect student retention. *The Review of Higher Education*, 22(1), 55–72.
- Nakamura, J., Shernoff, D. J., & Hooker, C. H. (2009). *Good mentoring: Fostering excellent practice in higher education*. San Francisco: Jossey-Bass.
- Nelson Laird, T. F., Bridges, B. K., Morelon-Quainoo, C. L., Williams, J. M., & Holmes, M. S. (2007). African American and Hispanic student engagement at minority serving and predominantly White institutions. *Journal of College Student Development*, 48(1), 39–56. doi:10.1353/csd.2007.0005.
- Nora, A. (2001). The depiction of significant others in Tinto's "Rites of Passage": A reconceptualization of the influence of family and community in the persistence process. *Journal of College Student Development*, 3(1), 41–56.

- Nora, A. (2002). A theoretical and practical view of student adjustment and academic achievement. In W. G. Tierney & L. S. Hagedorn (Eds.), *Increasing access to college: Extending possibilities for all students* (pp. 65–80). New York: SUNY Press.
- Nora, A., Barlow, L., & Crisp, G. (2005). Student persistence and degree attainment beyond the first year in college. In A. Seidman (Ed.), *College student retention: Formula for success* (pp. 129–153). Westport, CT: Praeger.
- Nora, A., & Cabrera, A. F. (1996). The role of perceptions of prejudice and discrimination on the adjustment of minority students to college. *Journal of Higher Education*, 67, 119–148.
- O'Meara, K. A., & Braskamp, L. (2005). Aligning faculty reward systems and development to promote faculty and student growth. *NASPA Journal*, 42(2), 223–240.
- O'Neil, J. M., & Wrightsman, L. S. (2001). The mentoring relationship in psychology training programs. In S. Walfish & A. Hess (Eds.), *Succeeding in graduate school: The complete career guide for the psychology student* (pp. 113–129). Hillsdale, NJ: Erlbaum.
- Outcalt, C. L., & Skewes-Cox, T. E. (2002). Involvement, interaction, and satisfaction: The human environment at HBCUs. *The Review of Higher Education*, 25(3), 331–347.
- Padgett, R. D., Johnson, M. P., & Pascarella, E. T. (2012). First-generation undergraduate students and the impacts of the first year of college: Additional evidence. *Journal of College Student Development*, 53(2), 243–266.
- Padilla, A. M. (1994). Ethnic minority scholars, research, and mentoring: Current and future issues. *Educational Researcher*, 23(4), 24–27.
- Paglis, L. L., Green, S. G., & Bauer, T. N. (2006). Does adviser mentoring add value? A longitudinal study of mentoring and doctoral student outcomes. *Research in Higher Education*, 47(4), 451–476.
- Palmer, R., & Gasman, M. (2008). "It takes a village to raise a child": The role of social capital in promoting academic success for african american men at a Black College. *Journal of College Student Development*, 49(1), 52–70.
- Park, S. M. (1996). Research, teaching, and service: Why shouldn't women's work count? *Journal of Higher Education*, 67(1), 46–84.
- Pascarella, E. T. (1980). Student-faculty informal contact and college outcomes. *Review of Educational Research*, 50(4), 545–595.
- Pascarella, E. (1985). College environmental influences on learning and cognitive development: A critical review and synthesis. In J. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 1, pp. 1–61). New York: Agathon.
- Pascarella, E. T. (2006). How college affects students: Ten directions for future research. *Journal of College Student Development*, 47(5), 508–520.
- Pascarella, E. T., & Terenzini, P. T. (1976). Informal interaction with faculty and freshman ratings of academic and non-academic experiences of college. *The Journal of Educational Research*, 70, 35–41.
- Pascarella, E. T., & Terenzini, P. T. (1978a). Student-faculty informal relationships and freshman year educational outcomes. *The Journal of Educational Research*, 71, 183–189.
- Pascarella, E., & Terenzini, P. (1978b). Student-faculty informal contact and college persistence: A further investigation. *The Journal of Educational Research*, 72, 214–218.
- Pascarella, E. T., & Terenzini, P. T. (1979). Interaction effects in Spady's and Tinto's conceptual models of college dropout. *Sociology of Education*, 52, 197–210.
- Pascarella, E. T., & Terenzini, P. T. (1981). Residence arrangement, student/faculty relationships, and freshman year educational outcomes. *Journal of College Student Personnel*, 22, 147–156.
- Pascarella, E. T., & Terenzini, P. T. (1983). Predicting voluntary freshman year persistence/withdrawal behavior in a residential university: A path analytic validation of Tinto's model. *Journal of Educational Psychology*; *Journal of Educational Psychology*, 75(2), 215.
- Pascarella, E. T., & Terenzini, P. T. (1991). *How college affects students: Findings and insights from twenty years of research*. San Francisco: Jossey-Bass.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research*. San Francisco: Jossey-Bass.

- Pascarella, E. T., Wolniak, G. C., Cruce, T. M., & Blaich, C. F. (2004). Do liberal arts colleges really foster good practices in undergraduate education? *Journal of College Student Development*, 45(1), 57–74.
- Patton, L. D., & Harper, S. (2003). Mentoring relationships among African American women in graduate and professional schools. *New Directions for Student Services*, 104, 67–78.
- Patton, L. (2009). My sister's keeper: A qualitative examination of mentoring experiences among African American women in graduate and professional schools. *The Journal of Higher Education*, 80(5), 510–537.
- Phinney, J. S. (1992). The multigroup ethnic identity measure: A new scale for use with diverse groups. *Journal of Adolescent Research*, 7, 156–176.
- Phinney, J. S. (1993). A three-stage model of ethnic identity development in adolescence. In M. E. Bernal & G. P. Knight (Eds.), *Ethnic identity: Formation and transmission among Hispanics and other minorities* (pp. 61–79). Albany, NY: State University of New York Press.
- Plata, M. (1996, September). Retaining ethnic minority faculty at institutions of higher education. *Journal of Instructional Psychology*, 23, 221–227.
- Ragins, B. R., & Scandura, T. A. (1999). Burden or blessing? Expected costs and benefits of being a mentor. *Journal of Organizational Behavior*, 20, 493–509.
- Rayman, P., & Brett, B. (1995). Women science majors: What makes a difference in persistence after graduation? *Journal of Higher Education*, 66(4), 388–414.
- Reddick, R. J. (2005). "Ultimately, it's about love": African American faculty and their mentoring relationships with African-American students. Retrieved December 1, 2005, from http://gseacademic.harvard.edu/~reddicri/Documents/Reddick_Ultimately_Its_About_Love.pdf
- Rendón, L. I., Jalomo, R. E., & Nora, A. (2000). Theoretical considerations in the study of minority student retention in higher education. In J. Braxton (Ed.), *Rethinking the departure puzzle: New theory and research on college student retention* (pp. 127–156). Nashville, TN: Vanderbilt University Press.
- Rosser, V. J. (2004). Faculty members' intentions to leave: A national study on their worklife and satisfaction. *Research in Higher Education*, 45(3), 285–309.
- Ruble, D. N. (1994). A phase model of transitions: Cognitive and motivational consequences. *Advances in Experimental Social Psychology*, 26, 163–214.
- Ryu, M. (2008). *Minorities in higher education 2008: Twenty-third status report*. Washington, DC: American Council on Education.
- Sax, L. J. (1994). Mathematical self-concept: How college reinforces the gender gap. *Research in Higher Education*, 35, 141–166.
- Sax, L. J., Bryant, A. N., & Harper, C. E. (2005). The differential effects of student-faculty interaction on college outcomes of women and men. *Journal of College Student Development*, 46(6), 642–657. doi:10.1353/csd.2005.0067.
- Schlosser, L. Z., & Gelso, C. J. (2001). Measuring the working alliance in advisor–advisee relationships in graduate school. *Journal of Counseling Psychology*, 48(2), 157–167. doi:10.1037//0022-067.48.2.157.
- Schneider, M. (2010). Finishing the first lap: The cost of first-year student attrition in America's four-year colleges and universities. *American Institutes for Research*.
- Seifert, T. A., Drummond, J., & Pascarella, E. T. (2006). African-American students' experiences of good practices: A comparison of institutional type. *Journal of College Student Development*, 47(2), 185–205.
- Sellers, R. M., Chavous, T. M., & Cooke, D. Y. (1998). Racial ideology and racial centrality as predictors of African American college students' academic performance. *Journal of Black Psychology*, 24, 8–27.
- Smith, B. (2007). Accessing social capital through the academic mentoring process. *Equity and Excellence in Education*, 40(1), 36–46.
- Snow, S. G. (1973). Correlates of student–faculty interaction. *Sociology of Education*, 46, 489–498.
- Spady, W. (1970). Dropouts from higher education: An interdisciplinary review and synthesis. *Interchange*, 1, 64–85.

- Spady, W. (1971). Dropouts from higher education: toward an empirical model. *Interchange*, 2, 38–62.
- Stanley, C. A. (2006). Coloring the academic landscape: Faculty of color breaking the silence in predominantly White colleges and universities. *American Educational Research Journal*, 43(4), 701–736.
- Stanley, C. A., Porter, M. E., Simpson, N. J., & Ouellett, M. L. (2003). A case study of the teaching experiences of African American faculty at two predominantly White research universities. *Journal of Excellence in College Teaching*, 14, 151–178.
- Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist*, 52(6), 613–629.
- Strauss, L. C., & Fredericks, V. J. (2004). Predictors of student commitment at two-year and four-year institutions. *Journal of Higher Education*, 75(2), 203–227.
- Strayhorn, T. (2008). The role of supportive relationships in facilitating African American Males' success in college. *NASPA Journal*, 45(1), 26–48.
- Suarez-Balcazar, Y., Orellana-Damacela, L., Portillo, N., & Andrews-Guillen, C. (2003). Experiences of differential treatment among college students of color. *Journal of Higher Education*, 74(4), 428–444.
- Suitor, J. J., Mecom, D., & Feld, I. S. (2001). Gender, household labor, and scholarly productivity among university professors. *Gender Issues*, 19(4), 50–67.
- Supplee, P. D., Lachman, V., Siebert, B., & Anselmi, K. (2008). Managing nursing student incivility in the classroom, clinical and on-line. *Journal of Nursing Law*, 12(2), 68–77.
- Tan, D. L. (1995). Perceived importance of role models and its relationship with minority student satisfaction and academic performance. *NACADA Journal*, 15(1), 48–51.
- Tenenbaum, H. R., Crosby, F. J., & Gilner, M. D. (2001). Mentoring relationships in graduate school. *Journal of Vocational Behavior*, 59, 326–341.
- Terenzini, P., & Pascarella, E. (1980). Student/faculty relationships and freshman year educational outcomes: A further investigation. *Journal of College Student Personnel*, 27, 521–528.
- Terenzini, P. T., Theophilides, C., & Lorang, W. G. (1984). Influence on students' perceptions of their academic skill development during college. *Journal of Higher Education*, 55, 621–635.
- Tierney, W. G. (1997). Organizational socialization in higher education. *Journal of Higher Education*, 68, 1–16.
- Tierney, W. G. (1999). Models of minority college-going and retention: Cultural integrity versus cultural suicide. *The Journal of Negro Education*, 68(1), 80–91.
- Tierney, W., & Bensimon, E. M. (1996). *Promotion and tenure: Community and socialization in academe*. Albany, NY: State University of New York Press.
- Tinto, V. (1975). Dropout from higher education: a theoretical synthesis of recent research. *Review of Educational Research*, 45, 89–125.
- Tinto, V. (1993). *Leaving college: Rethinking causes and cures of student attrition* (2nd ed.). Chicago, IL: The University of Chicago Press.
- Tsui, L. (1995, November). *Boosting female ambition: How college diversity impacts graduate degree aspirations of women*. Paper presented at the annual meeting of the Association for the Study of Higher Education, Orlando, FL.
- Tuitt, F., Hanna, M., Martinez, L. M., Salazar, M. C., & Griffin, R. (2009, Fall). Teaching in the line of fire: Faculty of color in the academy. *Thought and Action: The NEA Higher Education Journal*, 16, 65–74.
- Turner, C. S. V., & Myers, S. L. (2000). *Faculty of color in academe: Bittersweet success*. Boston, MA: Allyn and Bacon.
- Twale, D., & Sanders, C. S. (1999). Impact of non-classroom experiences on critical thinking ability. *NASPA Journal*, 36(2), 133–146.
- Umbach, P. D. (2006). The contribution of faculty of color to undergraduate education. *Research in Higher Education*, 47(3), 317–345.
- Umbach, P. D., & Wawrzynski, M. R. (2005). Faculty do matter: The role of college faculty in student learning and engagement. *Research in Higher Education*, 46(2), 153–184.

- Volkwein, J. F., King, M. C., & Terenzini, P. T. (1986). Student-faculty relationships and intellectual growth among transfer students. *Journal of Higher Education*, 57, 413-430.
- Vreeland, R. S., & Bidwell, C. E. (1966). Classifying university departments: An approach to the analysis of their effects upon undergraduates' values and attitudes. *Sociology of Education*, 39, 237-254.
- Waldeck, J. H., Orrego, V. O., Plax, T. G., & Kearney, P. (1997). Graduate student/faculty mentoring relationships: Who gets mentored, how it happens, and to what end. *Communication Quarterly*, 45, 93-109.
- Wallace, W. L. (1963). *Peer Groups and student achievement: The college campus and its students* (Report No. 91). Chicago, IL: National Opinion Research Center, University of Chicago.
- Walton, J. M. (1979). Retention, role modeling, and academic readiness: A perspective on the ethnic minority student in higher education. *The Personnel and Guidance Journal*, 58(2), 124-127.
- Warburton, E. C., Bugarin, R., & Nunez, A. M. (2001). *Bridging the gap: Academic preparation and postsecondary success of first-generation students* (NCES Report No. 2001-153). Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Weidman, J. C. (1989). Undergraduate socialization: A conceptual approach. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 5, pp. 289-322). New York: Agathon Press.
- Weidman, J. C. (2006). Socialization of students in higher education. In C. F. Conrad & R. C. Serlin (Eds.), *The sage handbook for research in education* (pp. 253-262). Thousand Oaks, CA: SAGE Publications.
- Weidman, J. C., & Stein, E. L. (2003). Socialization of doctoral students to academic norms. *Research In Higher Education*, 44(6), 641-656.
- Weidman, J. C., Twale, D. J., & Stein, E. L. (2001). *Socialization of graduate and professional students in higher education: A perilous passage?* (Vol. 28). San Francisco: Jossey-Bass.
- Williams, B. N., & Williams, S. M. (2006). Perceptions of African American male junior faculty on promotion and tenure: Implications for community building and social capital. *Teachers College Record*, 108(2), 287-315.
- Wilson, R. C., & Gaff, J. G. (1975). *College professors and their impact on students*. New York: Wiley.
- Wilson, R., Gaff, J., Dienst, E., Wood, L., & Bavry, J. (1975). *College professors and their impact on students*. New York: Wiley-Interscience.
- Wilson, R., Wood, L., & Gaff, J. (1974). Social-psychological accessibility and faculty student interaction beyond the classroom. *Sociology of Education*, 47, 74-92.
- Zusman, A. (1999). Issues facing higher education in the 21st century. In P. G. Altbach, R. O. Berdahl, & P. J. Gumport (Eds.), *American higher education in the twenty-first century: Social, political, and economic challenges* (pp. 109-148). Baltimore, MD: The Johns Hopkins University Press.

Chapter 13

State Support of Higher Education: Data, Measures, Findings, and Directions for Future Research

David A. Tandberg and Casey Griffith

State Support of Higher Education: Data, Measures, Findings, and Directions for Future Research

Higher education provides students with the opportunity for upward mobility and personal development. In addition, higher education delivers to states an educated workforce and citizenry as well as economic stimulation. A major factor in determining how well higher education can achieve these objectives is the fiscal resources of the institutions. In fact, there is evidence that state's higher education funding impacts both access and quality and is therefore an issue of real social importance (e.g., Kane & Orszag, 2003; Koshal & Koshal, 2000; Heller, 1999; Volkwein, 1989). In each state, public institutions receive a significant portion of their funding from state coffers. In fact, while the actual level may depend on the precise definition or data source, in 2011, states spent around \$79 billion on higher education, not counting tuition and fees (Grapevine System, 2011). Yet, the importance of higher education in each state, expressed through quantity of appropriated funds, varies greatly in the United States. Additionally, measured a variety of ways, states' commitment to higher education has been shown to be fickle, and most recently, in the face of increasingly scarce resources, states have generally shown less of a financial commitment to higher education. This phenomenon is observable to the degree that many scholars, institutional leaders, and policy experts are discussing the "privatization" of public higher education. It makes sense then that state funding for higher education has received much attention in both higher education policy literature and the mainstream media.

Recent scholarly attention to the issue of what factors explain and/or predict state support of higher education has led to a flurry of new theoretical explanations and

D.A. Tandberg, Ph.D. (✉) • C. Griffith
Higher Education, Educational Leadership and Policy Studies, Florida State University,
1205H Stone Building, Tallahassee, FL 32306-4452, USA
e-mail: dtandberg@fsu.edu

empirical findings. While much of this attention has been motivated by the recent relative decline in state support for higher education, these scholarly advances have been made possible by the introduction of new theories and empirical measures borrowed from political science and economics and new (at least to the field of higher education research) econometric techniques. Recent research has revealed the significant influence of the following: Various political factors, which, until recently, were dismissed as relatively unimportant; other state budgetary demands (i.e., Medicaid); budgetary trade-offs (where one state budgetary area is supported at the expense of another); the business cycle; income inequality; and state higher education governance structures, just to name a few (e.g., Delaney & Doyle, 2011; Doyle, 2007; McLendon, Hearn, & Mokher, 2009; Tandberg, 2010a, 2010b).

Despite the attention paid to state support of higher education in the scholarly literature, considerable confusion remains. This confusion and disagreement exists in regard to trends in state support and what factors influence state support of higher education. The source of the confusion and disagreement is the fact that empirical evaluations of state funding of higher education differ in regard to their data sources, measures (in regard to both dependent and independent variables), methods, and what time periods they cover. In addition, because of the relatively rapid progress in the last several years, it has become difficult to keep up with the many new findings. To date, there has not yet been a comprehensive evaluation of what we know and what we do not know. Such an evaluation would need to make sense of:

1. The various sources that provide data on state funding of higher education
2. The various ways state funding can be conceptualized and measured
3. The various guiding theories on determinants of state support
4. The independent variables (and categories of variables) that have been found to significantly impact state funding of higher education
5. The various methods for evaluating state funding of higher education and factors related to it
6. Any innovations in this area
7. What is left unknown and directions for future research

This chapter attempts to do just that, with an emphasis on informing the direction of future, empirical research designed to predict and explain state support of higher education. Therefore, when data sources and measures are discussed, they will be discussed from the perspective of their utility in explanatory models. Likewise, this chapter will primarily focus on studies which employ inferential statistics meant to explain state support of higher education and theories that can guide such research. Put succinctly, the ultimate goal of this chapter is to provide future researchers interested in predicting and explaining state support of higher education with the tools they need to advance the field's understanding of this important topic.

This chapter will begin with a review of the popular sources for data on state funding of higher education and then go into a discussion of the most commonly used measures of state support. The chapter begins with these discussions because it is critical to understand these details in order to make sense of the disparate findings in the literature, to properly understand state support of higher education

and examine the historical trends in state support. Therefore, these first two sections will inform the remainder of the chapter. The chapter will then move on to discuss the other topics in the order listed above.

Analysis of State Higher Education Funding Data Sources

Researchers need to understand the distinctions among the various sources of data and carefully choose the source that best matches what they are trying to explain. Additionally, researchers must be clear when discussing their data why they chose their particular source and explain the relevant details regarding what constitutes the data and possible implications for the results of their study. This section will attempt to provide researchers with the information they need to accomplish both of those tasks.

Policy analysts and researchers primarily rely on five data collection efforts for measures of state funding of higher education. These sources are the National Association of State Budget Officers' (NASBO) annual *State Expenditure Reports*, the Grapevine *Annual Compilation of State Fiscal Support for Higher Education*, the State Higher Education Executive Officers' *State Higher Education Finance* (SHEF) report, the US Census, and the National Center for Education Statistics (NCES). The organizations discussed here do far more than simply collect data on state funding of higher education, and several produce rather sophisticated reports that include additional data (beyond what are discussed here) and analysis related to higher education finance. However, for the purposes of this chapter, the discussion will center specifically on the higher education funding data each organization collects.

1. *NASBO's State Expenditure Reports*: NASBO collects higher education expenditure data as part of its annual *State Expenditure Report*. The *State Expenditure Reports*, published since 1987, include state spending on all major state expenditure areas.
2. *Grapevine*: The Grapevine project was begun in 1958 by M. M. Chambers and entails an annual survey of state higher education and government officials. The *Grapevine* data is collected by The Center for the Study of Education Policy at Illinois State University.
3. *State Higher Education Finance* (SHEF) data: The SHEF data is collected by State Higher Education Executive Officers (SHEEO). SHEF builds directly on an earlier 25 year effort by Kent Halstead and reports data from 1980. The reports include extensive data analysis with the intent of helping state policymakers answer several critical higher education finance questions related to adequacy and productivity as well as trends. Since the 2009–2010 collection year, the *SHEF* and *Grapevine* surveys have been merged, creating the State Support for Higher Education Database. This was done to streamline the data collection efforts and to minimize the burden placed on states in reporting these data. Nevertheless, the focus of the respective organizations' reports maintains many of their historic distinctions.

4. *United States Census*: Census data on state expenditures for higher education come from two surveys: (1) the Annual Survey of State and Local Government Finances and (2) the Annual Survey of State Government Finances. These data have been collected annually since 1951.¹
5. *NCES*: NCES currently collects financial data via their Integrated Postsecondary Education Data System's (IPEDS) finance survey. This data collection effort has existed under this name since 1987. Data are available from the IPEDS website. Previous to 1987, similar data were collected via the now discontinued Higher Education General Information Survey for *The Digest of Education Statistics*. Currently, *The Digest* relies on IPEDS data.

Comparison of Data Collected

There are several state budgetary concepts that need to be understood in order to properly understand and discuss state funding of higher education and the various collections of those data. First, the difference between appropriations and expenditures needs to be understood. Appropriations include the money that the state governments have set aside for higher education. *Grapevine* and *SHEF* both collect data on appropriations. Expenditures, on which *NASBO* and the *Census* collect data, include the money that was actually spent on higher education. The latter of course are only available at a later date than the former. The amounts can and do vary, as mid-year changes are common (in response to budgetary demands, states may not end up giving all the promised support or ask for funds back). *IPEDS* collects data on funds received by the institutions and, therefore, can be understood as measuring actual state expenditures as reported by them.

Second, it is important to understand the various categories or types of state appropriations and expenditures. These are commonly broken down as follows:

- *General funds* are funds that are appropriated through the normal budgetary or appropriations process. Most often when a state-funded organization discusses their "state budget," they are referring to their general fund appropriation. These appropriations are mostly funded by broad-based taxes; however, to a greater or lesser extent (depending in the state), they may also be funded by nontax resources such as state lotteries.
- *Capital funds* may be distributed through the annual (or biennial, as the case may be) appropriations process or through a separate process. These funds go toward the specific purpose of supporting new construction; significant

¹Researchers have also gathered state funding of higher education data from *The Statistical Abstracts of the United States* (the country's data book). However, since *The Statistical Abstracts* rely on other data sources for their funding figures (including recently *SHEF* for state funding of higher education data and *NASBO* for total state expenditure data), they are not discussed here.

improvements; and the purchase of equipment, land, and existing structures. These are often funded by the tax resources of the state, bonds, and/or special state endowments.

- *Non-appropriated funds* are those funds that are designated for a specific purpose and are not distributed through the normal state budgetary or appropriations process. Examples of these types of funds include institutional support generated from receipt of lease income and oil/mineral extraction fees.
- *State grants and contracts* are nonrecurring and are entered into on an as-needed basis between the state and specific institutions for the delivery of some sort of service such as an evaluation project.

The various data collections reviewed here include all or some of these funds (several also include tuition and fees). Additionally, several of the data sources allow for the tracking of local support of higher education. The specific types of monies within these fund categories will be considered within the discussion of each data collection. This section discusses each collection in detail, examining exactly what each attempts to measure and the data each collects. Table 13.1 summarizes this information.

National Association of State Budget Officers (NASBO)

NASBO defines state support of higher education as expenditures reflecting support for community colleges; public colleges and universities; vocational education, law, medical, veterinary, nursing, and technical schools; assistance to private colleges and universities; as well as capital construction, tuition, fees, and student loan programs. Higher education expenditures exclude federal research grants and endowments to universities.^{2,3}

Fund revenue sources include:

- Sales tax
- Gaming tax
- Corporate income tax
- Personal income tax
- Other taxes and fees (depending on the state, these may include cigarette and tobacco taxes, alcoholic beverage taxes, insurance premiums, severance taxes, licenses and fees for permits, inheritance taxes, and charges for state-provided services)
- Tuition and fees and student loan programs (in most states)

²The reporting instructions have remained consistent since 1990. In 1989, states were given very general guidance (i.e., to *exclude* federal research grants and to *include* tuition and fees and support for community colleges). In the first 2 years (1987 and 1988), states were asked to exclude tuition and fees and federal research grants.

³For additional details and to view examples of NASBO's *State Expenditure Reports*, visit their website here: <http://nasbo.org/>

Table 13.1 Characteristics of state higher education funding data sources

	NASBO ^a		Grapevine		SHEF	Census		NCES/IPEDS	
Timeframe	Fiscal year		Fiscal year		Fiscal year	Fiscal year		Fiscal year	
State endowment income included	No		Yes		Yes	Yes		No	
Med/health included	Yes		Yes		No	Yes, for medical education		Yes	
State governing or coordinating boards included	Assume yes		Yes		Yes	Assume yes		Yes	
Tuition and fees included	Yes		No		Yes	Assume yes		Yes	
Student loan programs included	Yes		No		No	No		No	
Student grant aid included	Assume yes		Yes		Yes	No		Yes	
Capital funding included	Yes		No		No	Yes		No	
Private higher education included	Yes		Yes		Yes (delaminated only after 1999)	No		Yes	
Nontax appropriated funds included	Assume yes		No before 2010; Yes after		Yes	Yes		Yes	
Funding received from non-appropriated sources included	Assume yes		No before 2010; yes after		Yes	Yes		Assume yes	
Funding received from Nonrecurring sources (grants, contracts, etc.) included	No (not clear)		No (not clear)		No (not clear)	Yes		Yes	
Federal flow-through funds included	Yes		No		No	Yes		No	
Auxiliary enterprises included	Assume no		No		No	Yes		Yes	
Separately reports ARRA funds	No		Yes		Yes	No		No	
Sector data provided	No		Years before 2010		No	No		Yes, by aggregating	
Institution level data provided	No		Years before 2010		No	No		Yes	

Unit of analysis	State governments	State governments	State and local governments	State and local governments	Institutions (data may be aggregated to the state level)
Years included	1986 to current	1961 to current	1980 to current	1951 to current	Separately: HEGIS 1966–1986; IPEDS – 1987 to current
Person/organization responsible	Chief state budget officers	State higher education finance officer	State higher education finance officer	State finance/budget officers	Higher education institutions
Appropriations or expenditures	Expenditures	State appropriations	State and local appropriations	Total expenditures	Institution's governmental revenues

[a](#)The lack of specificity in the reporting guidelines, and their general reporting categories, makes it difficult to precisely determine all of what is included in, or reported by the states into, the NASBO collection

NASBO breaks their expenditure data down into six categories including general fund expenditures, federal funds, other state funds, bond expenditures, state funds, and total funds. NASBO also reports state capital expenditures separately. Capital expenditures for each area are broken down into the same categories listed above. NASBO asks states for lump sum amounts for each of the categories; therefore, the data cannot be broken down any further. They define the six categories in this way:

- General fund: The predominant fund for financing a state's operations. Revenues are received from broad-based state taxes.
- Federal funds: Funds received directly from the federal government (other than research grants).
- Other state funds: Expenditures from revenue sources that are restricted by law for particular governmental functions or activities (i.e., tuition and fees and lottery supported expenditures).
- Bonds: Expenditures financed by the sale of bonds.
- State funds: General funds plus other state fund spending, excluding state spending from bond proceeds.
- Total funds: Refers to funding from all sources – the sum of general fund, federal funds, other state funds, and bonds.

Figure 13.1 below displays the amount for total funds and general funds expended for HE from 1990 to 2010. The general fund declines from 2008 through 2010 most likely occur because that category does not include federal stimulus dollars (assumed to be included in the federal funds category) and also does not include tuition and fees, both of which increased to help stabilize total institutional revenue during the most recent recession.

The NASBO *Expenditure Reports* include a table which indicates what expenditure sources were excluded by which states. For example, in calculating higher education expenditures for fiscal 2010, 11 states wholly or partially excluded tuition and fees, and 19 states wholly or partially excluded student loan programs. Additionally, other items that are wholly or partially excluded include university research grants (32 states), postsecondary vocational education (17), and assistance to private colleges or universities (22). The items excluded by various states generally, though not always, fall into the "Other State Funds" category. It is not clear from the NASBO data whether, for example, each of the 22 states that did not provide any assistance to private institutions or if some of them did but were not reporting those data. These reporting figures also vary year to year, for example, in 2009, 13 states wholly or partially excluded tuition and fees compared to the 11 in 2010 (this could be the result of changes in state finance practices or because states chose not to fully report in 2010). This possible variation in reporting practices may explain why there is more year-to-year variance in the NASBO data than there is in either the Grapevine, SHEF, or Census data. It also potentially makes cross-state comparisons nearly impossible.

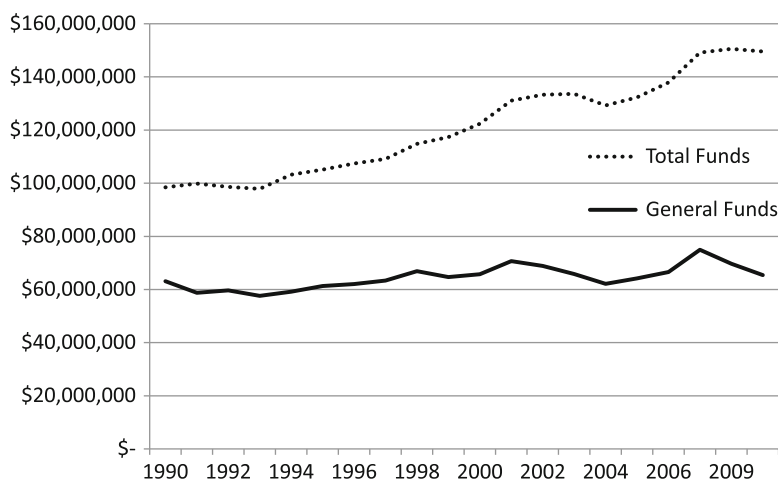


Fig. 13.1 NASBO expenditures on higher education (all US states), 1990–2009 (Source: NASBO; Calculations: Author's; real dollars (thousands) adjusted by HECA [The Higher Education Cost Adjustment (HECA) is an inflation adjustment developed by SHEEO specifically for higher education. The details of HECA can be found in the SHEF reports (http://www.sheeo.org/finance/shef/SHEF_FY11.pdf)]⁴

Benefits of the NASBO data:

- The six separate categories of funds allow the researcher to isolate the expenditure areas of interest.
- Provides data on capital expenditures
- Provides data on federal flow-through funds that can be separated from state-originated funds.
- Provides total state expenditures and expenditures by major state budgetary area, providing a single source for comparison purposes.
- Allows for yearly corrected data.

Potential drawbacks:

- The lack of consistency makes cross-state comparisons difficult, as what is reported often varies significantly by state.⁵

⁴For example, Zumeta (1992, 1996) reported that in 1988, 21 states provided direct financial support to private colleges and universities. NASBO reports that in 1988, 20 states excluded data on funding for private colleges and universities, meaning 30 states reported those data. However, some may have reported \$0s.

⁵As indicated, NASBO does track which states leave out what elements, which helps when attempting to make cross-state comparisons.

- Data definitions are not very detailed.
- Does not provide any local government expenditure data.
- Data are only available in PDF form.
- Data cannot be disaggregated any further than the six fund categories provided in the reports.

Grapevine

As indicated earlier, the Grapevine report draws its data from the State Support for Higher Education Database collection which asks states to report only appropriations, not actual expenditures, and report only sums appropriated for annual operating expenses (State Higher Education Executive Officers [SHEEO], 2011).

From this collection, the Grapevine report makes use of the following data elements: state support generated from taxes and those generated from nontax sources (previous to 2010 Grapevine only included appropriations from tax monies). The resulting figure is what Grapevine refers to as “state effort.”⁶

The tax-generated data points include⁷:

- Sums appropriated to four-year public colleges and universities
- Sums appropriated for state aid to local public community colleges, for the operation of state-supported community colleges, and for vocational-technical two-year colleges or institutes that are predominantly for high school graduates and adult students
- Sums appropriated to statewide coordinating boards or governing boards, either for board expenses or for allocation by the board to other institutions or both
- Sums appropriated for state scholarships or other student financial aid
- Sums destined for higher education but appropriated to some other state agency (as in the case of funds intended for faculty fringe benefits that are appropriated to the state treasurer and disbursed by that office)
- Appropriations directed to private institutions of higher education at all levels

⁶ Additional information and the Grapevine data can be found at the project website here: <http://grapevine.illinoisstate.edu/>

⁷ For those years in which American Recovery and Reinvestment Act (ARRA) dollars were provided to states to support higher education, states were asked by SSHED to report:

- “education stabilization funds used to restore the level of state support for public higher education;
- government services funds used for public higher education (excluding modernization, renovation, or repair); and
- government services funds used for modernization, renovation, or repair of higher education institutions (public and private).

Government services funds used for modernization, renovation, or repair of higher education institutions were excluded from *Grapevine* analyses.”

Since 2010, states are also asked to report on nontax-based funds, including:

- Funding under state auspices for appropriated nontax state support (i.e., monies from lotteries set aside for institutional support or for student assistance)
- Funding under state auspices for non-appropriated state support (e.g., monies from receipt of lease income and oil/mineral extraction fees on land set aside for public institution benefit).
- Nontax sums destined for higher education but appropriated to some other state agency.
- Interest or earnings received from state-funded endowments set aside for public sector institutions.
- Portions of multiyear appropriations from previous years.

States are asked to exclude:

- Appropriations for capital outlays and debt service
- Appropriations of sums derived from federal sources, student fees, and auxiliary enterprises

In addition, the Grapevine project does not include local tax and nontax appropriations to higher education.

Figure 13.2 displays state tax appropriations using the Grapevine data (pre-2010 data). The data is inclusive of federal stimulus funds which helped state higher education tax appropriations continue their upward trajectory, albeit at a slightly slower rate.

Benefits of the Grapevine data:

- A well-established and recognized source for state operating appropriations for higher education
- The second longest running data source for state funding of higher education
- Clear data standards and definitions
- Provides additional analysis and relevant data on their website

Potential drawbacks:

- Does not include local support of higher education.
- A significant amount of their data is only available in PDF form on their website.
- After 2010, disaggregation by institution, system level, and funding type (financial aid, etc.) is no longer possible.
- They do not provide data on state capital appropriations, federal “flow-through” money (federal dollars that are appropriated by the state to higher education), or auxiliary enterprises.
- Because they began adding nontax funds to their measure in 2010, the data from their website going forward cannot be compared to pre-2010 data.⁸

⁸ Using data from the State Support for Higher Education Database and available from SHEEO, a consistent State Tax Effort measure can be constructed.

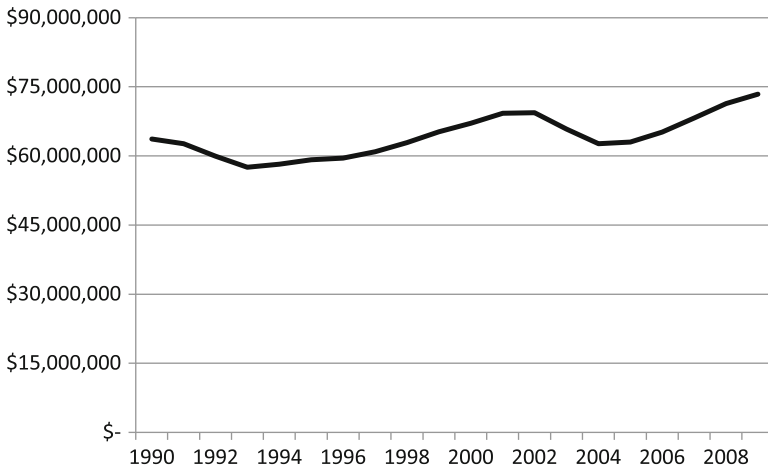


Fig. 13.2 Grapevine state tax effort for higher education (tax appropriations) (all US states), 1990–2009 (Source: Grapevine; Calculations: Author's; real dollars (thousands) adjusted by HECA)

SHEEO-SHEF

The annual SHEF report generated by SHEEO utilizes the State Support for Higher Education Database and uses the Grapevine “State Effort” measure as its base. It also makes use of local tax appropriations and tuition and fee data.⁹ The SHEF report breaks their data down into six primary categories:

1. State support: This measure is identical to Grapevine’s “State Effort” measure (from 2010 forward).
2. Local tax appropriations: Annual appropriations from local government taxes for public higher education institution operating expenses.
3. State and local support: State support plus local tax appropriations.
4. Educational appropriations: State and local support minus spending for research, agricultural, and medical education and support for independent institutions or students attending them.
5. Net tuition revenue: The sum of gross tuition and mandatory fees minus state-funded student financial aid, institutional discounts and waivers, and medical school student tuition revenue.
6. Total educational revenue: The sum of educational appropriations and net tuition revenue excluding any tuition revenue used for capital and debt service or similar nonoperational expenses.

⁹For additional information and for examples of the SHEF reports, please visit SHEEO’s website at <http://www.sheeo.org/>

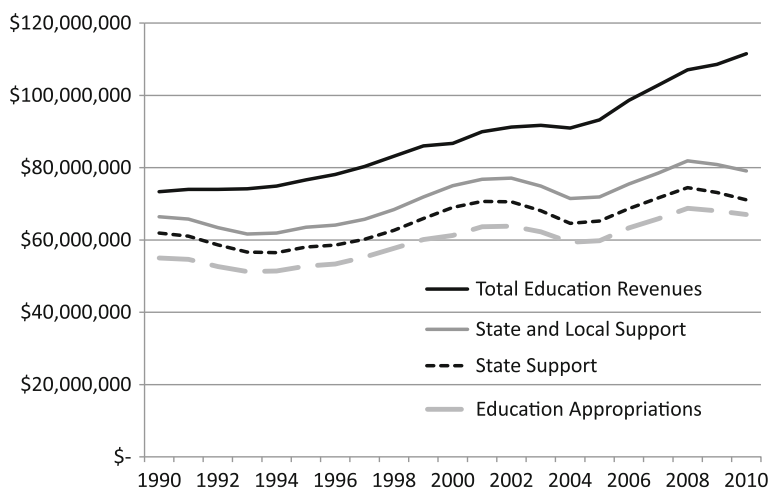


Fig. 13.3 SHEF state support of higher education (all US states), 1990–2010 (Source: SHEEO; Calculations: SHEEO's and author's; real dollars (thousands) adjusted by HECA)

The SHEF reports use these appropriations and revenue data as the basis for additional analysis utilizing cost and inflation adjustments and state full-time equivalent enrollments to address questions related to adequacy and productivity.

Figure 13.3 displays the trend lines for the SHEF categories. Each category shows a decline beginning in 2008 despite the inclusion of the federal ARRA dollars (federal stimulus funds), except total education revenues which includes tuition and fees.

Benefits of the SHEF data:

- Much of the raw data is available allowing the researcher the ability to cut, combine, and analyze the data in the way he or she chooses (including or excluding tuition, private higher education, local support, ARRA funding, etc.).
- A significant amount of the data is accessible via their website in Excel format.
- The description of the data and the data definitions are clear, specific, and easily found.
- The survey instrument is provided in their annual report.
- They provide a variety of inflation and cost adjustments with their data.
- The data collection has existed for a long enough period of time such that their data standards and survey instrument have become well understood and accepted.
- The SHEF report provides researchers and policymakers with extensive and useful data analysis.

Potential drawbacks:

- They do not make their entire dataset available for download from the website.
- They do not provide institutional or system level data.
- They do not provide data on state capital appropriations, federal “flow-through” money, or auxiliary enterprises.

Census

Census data on state expenditures for higher education comes from two surveys: (1) the Annual Survey of State and Local Government Finances and (2) the Annual Survey of State Government Finances.¹⁰ These data have been collected annually since 1951.¹¹

The Census surveys define expenditures as all amounts of money paid out by a government during its fiscal year – net of recoveries and other correcting transactions. Expenditures include payments from all sources of funds, including not only current revenues but also proceeds from borrowing and prior year fund balances. Expenditures include amounts spent by all agencies, boards, commissions, or other organizations categorized as dependent on the government concerned. Excluded from the Census expenditure data are:

- Loans or other extensions of credit
- Refunds of revenues collected during the same fiscal year
- Erroneous payments and other outlays that are recovered during the same fiscal year
- Purchase of securities for investment purposes
- Payments for the retirement of debt principal (interest on debt is reported as an expenditure)
- Transfers to other agencies or funds of the same government
- Agency or private trust transactions
- Noncash transactions
- Depreciation of capital assets

Within the larger expenditure categories described above, expenditures are broken down into direct expenditures that include everything (including capital) except intergovernmental expenditures (money directed from one government office to another) and current operations expenditures, which are direct expenditures minus capital expenditures. These expenditures are reported at both the state and local levels.

Within these surveys, expenditures for higher education include those directed to degree-granting institutions operated by state or local governments that provide academic training beyond the high school (grade 12). Reported expenditures include activities for instruction, research, public service (except agricultural extension services), academic support, libraries, student services, administration, and plant maintenance. Based on examination of the data, it appears that tuition and fees are included here. Also reported as higher education expenditures are those directed to auxiliary enterprises which include dormitories, cafeterias, bookstores, athletic

¹⁰ Additional details and the Census data can be found here: <http://www.census.gov/govs/estimate/>

¹¹ Researchers have also gathered state funding of higher education data from *The Statistical Abstracts of the United States* (the country's data book). However, since *The Statistical Abstracts* rely on other data sources for their funding figures (including, recently, SHEF for state funding of higher education data and NASBO for total state expenditure data), they are not discussed here.

facilities, contests, events, student activities, lunch rooms, student health services, college unions, college stores, and the like. State expenditures on higher education auxiliary enterprises amounted to \$18 billion nationally in 2008. Direct expenditures, expenditures for auxiliary enterprises and capital outlays, are separable for analysis. Likewise, local expenditures are reported separately using the categories discussed above.

Excluded expenditures include those directed to training academies or programs which do not confer college-level degrees; state vocational-technical schools which award certificates equal to less than 2 years of college; hospitals for the general public operated by universities; agricultural experiment stations, farms, and extension services; state scholarships and fellowships awarded to students; state aid to or in support of private colleges; and state administration of school building authorities.

Higher education-related capital expenditures are also collected by these surveys and are reported separately and also within the direct expenditures category. The Census defines capital outlay and project funds as: "Direct expenditures for contract or force account construction of buildings, grounds, and other improvements, and purchase of equipment, land, and existing structures. Includes amounts for additions, replacements, and major alterations to fixed works and structures. However, expenditure for repairs to such works and structures is classified as current operation expenditure."

Figure 13.4 displays the trend lines for the Census data. There is a fairly consistent trend upward progressing through the duration of the chart. The continued upward trajectory into the recession is indicative of the data including tuition and fees.

Benefits of the Census data:

- Census data collections are widely recognized and respected.
- It is the longest running collection.
- Data on higher education expenditures can be compared to data on expenditures in other areas from the same collection.
- It has long established data standards and definitions.
- Capital and auxiliary enterprise expenditures are included in the collection but are separable for analysis.
- Data are available in electronic form from their website.

Potential drawbacks:

- Aside from being able to separate out auxiliary, local, and capital expenditures, no additional disaggregation or combinations are possible.
- They do not provide institutional or system level data.
- It is not entirely clear what all is included under the category of higher education expenditures, that is, are tuition and fees included? Comparisons with the other data collections would indicate that they are. However, the inability of researchers to disaggregate tuition and fees is problematic for many analytic purposes.

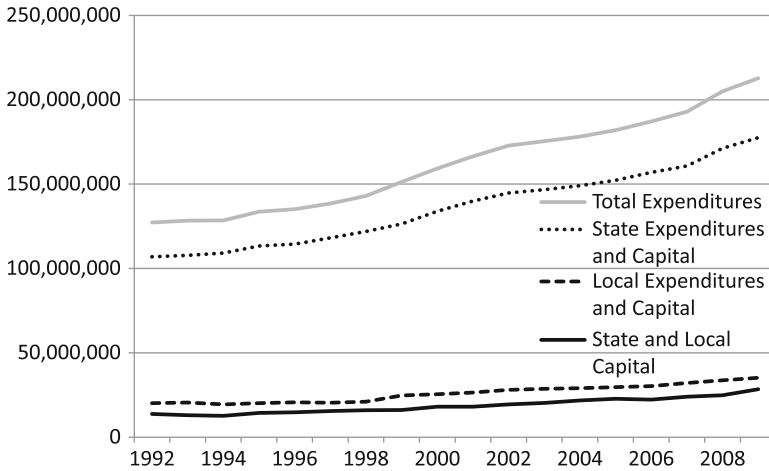


Fig. 13.4 Census expenditures on higher education (all US states), 1992–2009 (Source: U.S. Census; Calculations: Author's; real dollars (thousands) adjusted by HECA)

NCES

IPEDS collects data directly from institutions through a number of surveys addressing a number of different data domains. The data are provided to researchers at the institutional level via the IPEDS website.¹² Within the IPEDS finance survey, several relevant data points are collected. These include (reported separately for state and local sources)¹³:

- Institutional revenue from state and local appropriations: Defined as amounts received by the institution through acts of a state or local legislative body for meeting current operating expenses, not for specific projects or programs. Not included are grants and contracts and capital appropriations.
- Institutional revenue from state and local operating grants and contracts: Defined as revenues that are for specific research projects or other types of programs and that are classified as operating revenues.
- Institutional revenue from state and local nonoperating grants and contracts: Defined as amounts reported as nonoperating revenues from state governmental agencies that are provided on a non-exchange basis. This excludes capital grants and gifts.

¹² Additional information and the extensive IPEDS data can be found here: <http://nces.ed.gov/ipeds/datacenter/>

¹³ Institutions report data using the accounting standards they employ at their institutions (FASBE or GASBE); therefore, the categories vary slightly depending on the chosen standard. The Delta Cost Project has developed a useful crosswalk to merge across the standards.

- Revenue from grants by state/local government: Grants by state/local government include expenditures for scholarships and fellowships that were funded by the state.

The finance survey includes net institutional revenue from tuition and fees defined as revenues from all tuition and fees assessed against students (net of refunds and discounts and allowances) for educational purposes. The Delta Cost Project (discussed later) uses the IPEDS data and further refines the tuition and fees revenue measure by developing a net student tuition revenue measure which is net tuition and fee revenue coming directly from students (not including Pell, federal, state, and local student aid grants). The IPEDS finance survey also collects data on revenue from capital appropriations; however, it is a single category that combines federal, state, and local sources into one.

While the IPEDS system, and the web interface they have created, provides a huge amount of institutional level data that can be aggregated by the researcher to the state and national levels, that can be an unwieldy process. Fortunately, there are at least two sources that report out the IPEDS data in more usable formats. These are *The Digest of Education Statistics*, published by NCES, and The Delta Cost Project. The *Digest* has been reporting state and local appropriations since 1962. Since 1987, it has aggregated the IPEDS data to report those appropriation amounts.

The Delta Cost Project¹⁴ is a nonprofit, grant-supported organization whose primary mission is to bring greater attention to college spending through better data, cost metrics, and communication. One of the primary ways they are doing this is by using IPEDS data on institutional operating expenditures and revenues (like state appropriations) to develop measures of costs per student and costs per degree/certificate produced, organized into Carnegie classifications and separating public and private nonprofit institutions. The organization puts out regular reports which provide institution, state, and national level data. Additionally, The Delta Cost Project allows users to instantly download IPEDS state and local institutional revenue (appropriations and both types of grant and contracts) and expenditure data (with the Delta Cost Project's uniquely developed measures), plus a significant amount of additional institution level data, in a single, clean, and usable file.¹⁵

Displayed in Fig. 13.5, the NCES/IPEDS data (downloaded from the Delta Cost Project) are cut in several different ways: (1) state appropriations, which does not include grants and contracts; (2) state and local appropriations; (3) total state expenditures, which includes state appropriations plus state grants and contracts; (4) total state and local expenditures; and (5) total education expenditures which includes total state and local expenditures, net student tuition revenue (see above), and institutional revenue from state student grant aid. The first four data categories show a slight dip in 2008, which may indicate that institutions did not report stimulus funds

¹⁴ The full name is *The Delta Project on Postsecondary Education Costs, Productivity, and Accountability*. Additional information and the data can be found on its website found here: <http://www.deltacostproject.org/>

¹⁵ Starting in 2012, NCES will take over maintenance of the Delta Cost Project Database.

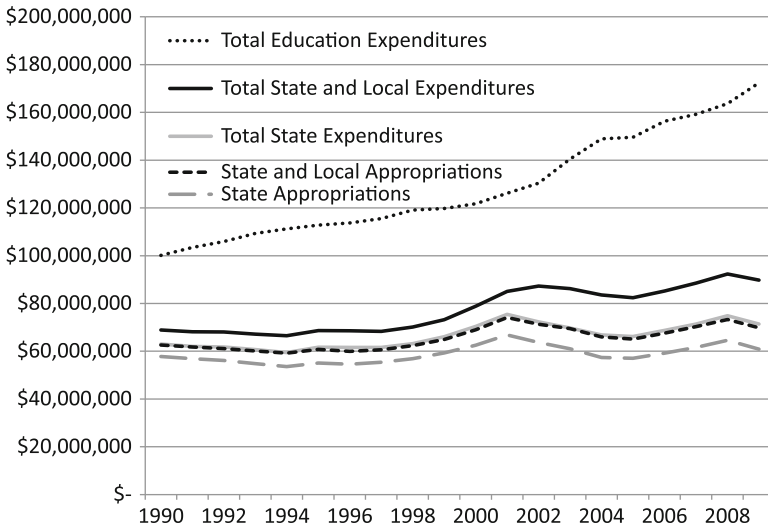


Fig. 13.5 NCES expenditures on higher education (all US states), 1990–2009 (Source: NCES/Delta Cost Project; Calculations: Delta Cost Project & Author's; real dollars (thousands) adjusted by HECA)

as state appropriations or it may simply show a general agreement with the SHEF data. The data reveal that institutions more than made up for any loss in government revenue with increases in tuition and fee revenue.

Benefits of the NCES data:

- Single source for extensive institutional data (enrollment, student demographics, revenues and expenditures, program, and other data points)
- A well-established survey from a well-known source
- Clear definitions
- Ability to cut the data by system, institution, and institution type (sector, level, classification, etc.)

Potential drawbacks:

- The data can be somewhat unwieldy for state and national analyses.
- Does not separate out state and local capital revenue.
- Extensive disaggregation by state budgetary categories is not possible.

Data Comparisons

In order to get a better sense of how the differences in what is collected by the various organizations impacts the actual data, the most comparable measures from each organization are placed in the same charts. First, the most exclusive data from each

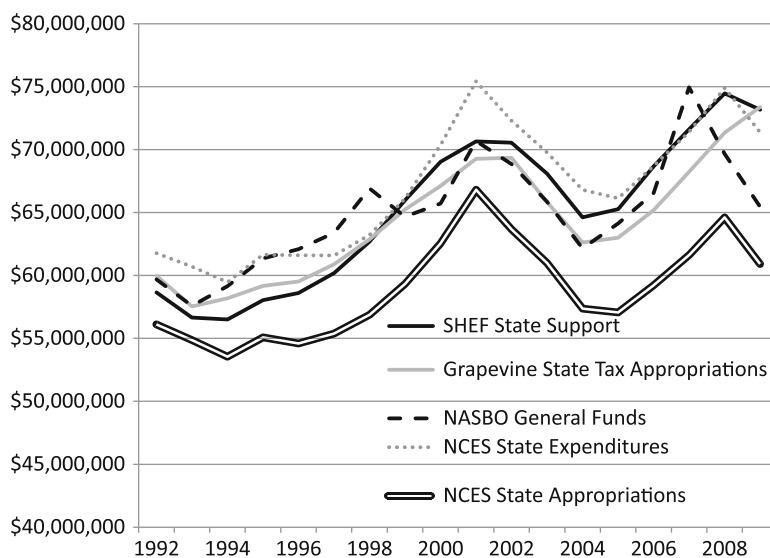


Fig. 13.6 Comparison of state general fund appropriations and expenditure data sources (Source: Grapevine, NASBO, NCES, & SHEEO; Calculations: Author's; real dollars (thousands) adjusted by HECA)

organization are compared. These data tend to isolate only state general fund appropriations or expenditures.¹⁶ Second, the most inclusive data from each organization are compared. These tend to include all state and local appropriations and expenditures, including expenditures from tuition and fees and for capital, financial aid, and grants and contracts.¹⁷

The trend lines for state general fund appropriations and expenditures (Fig. 13.6) tend to display similar patterns (while the levels vary significantly resulting from the differences in what is collected by each organization) with each revealing rather dramatic fluctuations throughout the time series. The most significant difference occurs at the end of the series, with the NASBO general fund data showing a dramatic decline in 2007, the two NCES measures and the SHEF data also showing declines, and the Grapevine data showing a slight increase (including ARRA funds).

¹⁶ Data from the Census are not included in the comparison as the most comparable Census measure (not including auxiliary enterprises, capital, or local expenditures) indicates that there was \$135 billion in state higher education expenditures in 2008. The closest of the other four sources (Grapevine) shows only \$73 billion in state higher education appropriations. The difference is most likely due to the Census data including tuition- and fee-based expenditures.

¹⁷ Grapevine data are not included in the second chart because the organization does not include a complete measure of total spending for higher education.

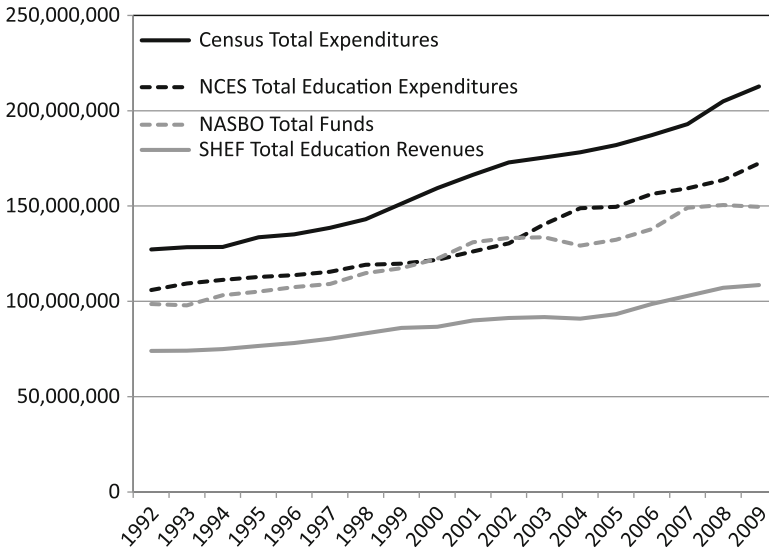


Fig. 13.7 Comparison of complete measures of higher education expenditures data sources (Source: Census, NASBO, NCES, & SHEEO; Calculations: Author's; real dollars (thousands) adjusted by HECA)

The NASBO data appear somewhat more erratic than the other measures. This is most likely due to the apparent lack of consistency in the way states report their data from year to year.

Simple correlation analysis (Table 13.2) reveals that the data series are highly correlated with each other. The NASBO data is the least correlated with the other measures. This again suggests the inconsistency of the NASBO data.

Analyzing the most inclusive state higher education expenditure data reveals that again the trends are fairly consistent, with the NASBO data showing a bit more volatility than the other series (Fig. 13.7).¹⁸ Much of the variation seen in the general fund data is smoothed, revealing how other revenue sources are used to make up for any year-to-year losses in base funding.

Predictably, these data are even more highly correlated than the general fund data, revealing almost perfect correlation (see Table 13.3). The NASBO data also correlate considerably better with this data series.

Both the various state general fund data and the various total expenditure data compared here tend to tell similar stories. However, there are important differences

¹⁸ As Grapevine does not include a “complete” measure of state support they are not included in this comparison.

Table 13.2 Correlation of state general fund appropriations and expenditures data sources

	NASBO general fund	Grapevine tax appropriations	SHEF state effort	NCES state expenditures	NCES state appropriations
NASBO general fund	1.000				
Grapevine tax appropriations	0.792	1.000			
SHEF state effort	0.839	0.974	1.000		
NCES state expenditures	0.808	0.896	0.905	1.000	
NCES state appropriations	0.824	0.936	0.964	0.971	1.000

Table 13.3 Correlation of complete measures of higher education expenditures data sources

	NASBO total expenditures	SHEF total education revenues	Census total expenditures	NCES total education expenditures
NASBO total expenditures	1.000			
SHEF total education revenues	.985	1.000		
Census total expenditures	.982	.988	1.000	
NCES total education expenditures	.940	.963	.975	1.000

in the levels of funding they report and also, at times, in the patterns of support over time. These differences are a result of the way the various organizations conceptualize state funding of higher education, what they intend to collect, and how they define their specific elements. As indicated at the beginning of this section, researchers need to understand the distinctions between the various sources of data and carefully choose the source that best matches what they are trying to explain. Additionally, researchers must be clear when discussing their data why they chose their particular source and explain the relevant details regarding what constitutes the data they employ and possible implications for the results of their study.

Measures of State Support of Higher Education

Using the data sources discussed above, researchers have conceptualized state support for higher education in a number of ways and developed quantitative measures accordingly. These measures have been developed in an effort to address certain underlying concepts of interest and to create normalized measures that can

be compared across the states (Trostel & Ronca, 2009). Some of the more popular ones include the natural log of actual state funding, funding per capita, funding per \$1,000 of personal income, funding as a share of total state expenditures, funding per full-time equivalent student (FTE), and finally a relatively new measure of what they call “state support of higher education” developed by Trostel and Ronca. This section will evaluate each measure overtime and compare and contrast them.

When the trend lines of the various measures do not agree, it is important to remember that this variation does not indicate that some measures are more accurate than others. Rather, the measures vary because they include different elements and are meant for different purposes. Therefore, they are telling different stories. It is likewise important to indicate at the outset that the goal of this section is not to identify the one “true” measure of state support of higher education as we are not considering the measures for comparative purposes; instead, we are considering these measures for their possible utility in explanatory models.¹⁹ When researchers attempt to explain and predict state support of higher education, they should be guided by their research questions and the underlying theory guiding their research when choosing their dependent variable. (What exactly are they trying explain?) For example, is the researcher primarily interested in the factors which predict how higher education fares in relation to other state budgetary areas? Or is the researcher interested in revealing the factors associated with the value states place on higher education relative to their state resources (e.g., appropriations in relation to state personal income)? This section will therefore endeavor to provide researchers with adequate information so that they can make informed decisions about their choice of dependent variable. Additionally, this section is meant to help set the stage for the later literature review portion, by providing more detailed information about the dependent variables employed.

All but one of the measures reviewed here involve dividing state higher education funding by a variable of interest. Trostel and Ronca (2009) divided several of the more commonly employed variables into two categories; these include what they call *ability to pay* variables and *need* variables. Ability to pay variables attempt to get at the capacity of the state to pay for (or support) higher education (i.e., state personal income). When ability to pay variables are used as a denominator under higher education funding, the result can be understood as a measure of a state’s “effort” in regard to higher education (capacity for funding compared to actual funding). Need variables attempt to gauge the demand for resources (e.g., FTE enrollments or youth population). When need is used as the denominator under actual funding, the resulting figure can be understood as a measure of adequacy (need for funding relative to actual funding). Most higher education funding measures can be placed into one of these categories. The majority of the remainder of

¹⁹ If the reader is interested in comparing and contrasting state higher education support measures, the discussion provided by Trostel and Ronca (2009) and the annual SHEF reports (SHEEO, 2011) are good places to start.

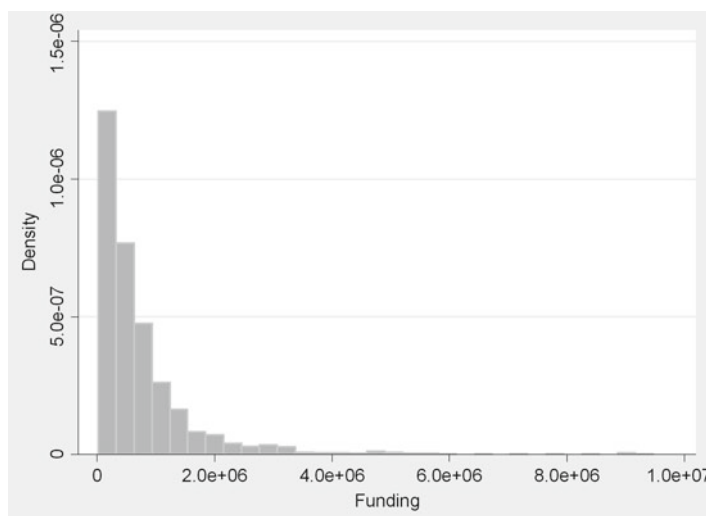


Fig. 13.8 Distribution of state tax support of higher education (1976–2005, all 50 states) (Source: Grapevine; Calculations: Authors')

this section will use these categories as a way of examining state higher education funding measures. First, however, we will discuss a more technical issue: using the natural log of actual state funding in regression equations.

The Natural Log of State Funding of Higher Education

Often, researchers seek to predict actual state funding of higher education and include any normalizing variables as predictor variables on the right-hand side of the regression equation (e.g., Lindeen & Willis, 1975; Rabovsky, 2012; Toutkoushian & Hollis, 1998). However, state funding for higher education is not normally distributed as this histogram using the Grapevine data on all 50 states from 1976 to 2005 shows the following (Fig. 13.8).

Therefore, researchers use the natural log of their funding variable which significantly improves the normality of the distribution (Fig. 13.9).

Clearly, researchers must either take the natural log or use a normalizing variable (like one of those discussed below) before using state funding of higher education in a regression equation. The benefit of using the natural log of actual state funding is that the researcher can talk in clear terms about the impact of the independent variables on state funding rather than the slightly more complex measures discussed next. The potential drawbacks of using this measure are that

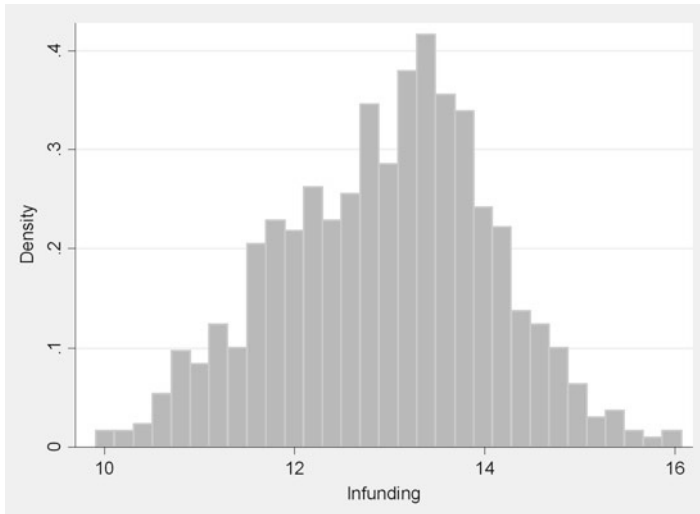


Fig. 13.9 Distribution of the natural log of state tax support of higher education (1976–2005, all 50 states) (Source: Grapevine; Calculations: Authors’)

the logged values themselves are for the most part meaningless to the average reader; likewise, the regression coefficients can be difficult to understand and translate, and finally, the measure itself does not take into account the ability of states to pay for higher education nor the financial need of the higher education institutions as reflected by enrollments or some similar indicator. However, such factors (enrollments) can be treated as independent/explanatory variables in the regression equation, which again hearkens back to the need to reflect on the purposes of the researcher.

State Higher Education Funding per Capita

State higher education funding per capita has been employed by various researchers (i.e., Goldin & Katz, 1998; Kane, Orszag, & Gunter, 2003). It may be seen as a measure of adequacy or effort, as the denominator in the equation, population, may appropriately be viewed, at least indirectly, as an ability to pay variable or as a need variable. Seen as an effort measure, states with larger populations may have a larger tax base (taxable citizens, products, commerce, and industries) and therefore be able to direct greater resources toward higher education. In fact, Trostel and Ronca (2009) suggest that population might be viewed as an ability to pay measure. Additionally, as an adequacy measure, a larger population may mean greater demand for higher education, as states with larger populations presumably have more students and prospective students to serve.

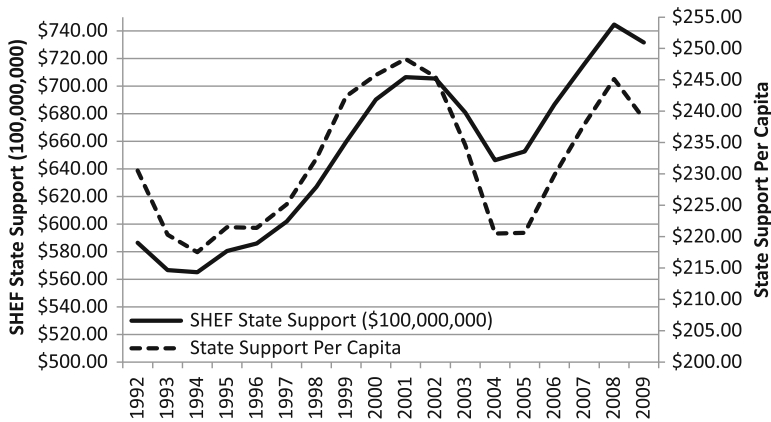


Fig. 13.10 State support per capita (Source: SHEEO, U.S. Census; Calculations: SHEEO’s and Author’s; real dollars (thousands))

Viewed from a national perspective, this state funding per capita is not terribly interesting, as the nation’s population has been steadily increasing, and so any significant variance in the measure is driven almost entirely by changes in the funding portion of the equation, which has risen faster than the nation’s population (see Fig. 13.10). However, a number of states have experienced significant population changes in the last 30 years (e.g., Arizona (+) and Michigan (–)) (US Census, 2011), and therefore, the measure becomes more meaningful at the state level, which is where most of higher education’s funding comes from.

Higher education funding per capita is an easily understood measure, and people are used to seeing state financial data displayed in per capita terms. It also accomplishes the important goal of normalizing state funding for higher education for population differences. However, from the perspective of it serving as a measure of effort or adequacy, it has some limitations as states with larger populations are not necessarily wealthier and states with larger populations do not necessarily send a significant portion of their population to college. If population is something a researcher is interested in, or desires to control for in a regression equation, it may make more sense to include it as an independent variable on the right-hand side of the equation where its impact on state higher education support can be controlled for and measured directly.

State Funding per \$1,000 of Personal Income

One of the more popular dependent variables in studies attempting to predict state support of higher education is state funding per \$1,000 of personal income

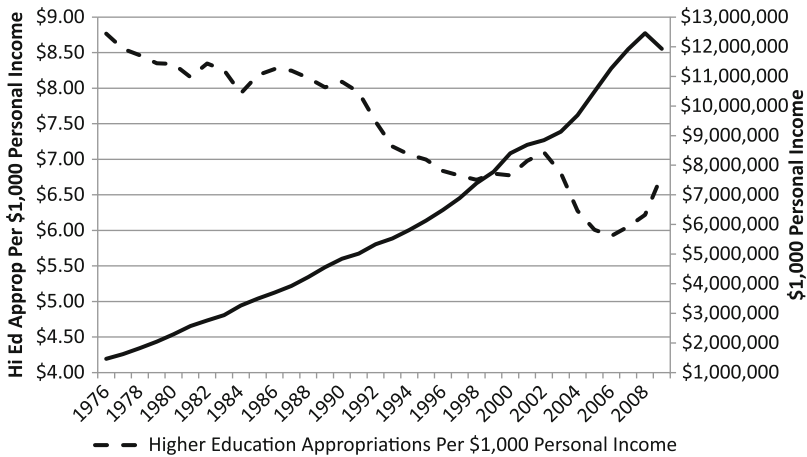


Fig. 13.11 State tax fund appropriations for higher education per \$1,000 of personal income (Source: Grapevine, Bureau of Economic Analysis; Calculations: Authors')

(e.g., Archibald & Feldman, 2006; Dar & Spence, 2011; McLendon, Hearn, et al., 2009; Tandberg, 2010b). Trostel and Ronca (2009) place personal income squarely within the ability to pay category of measures. In fact, those authors argue that (comparing personal income to other possible measures of ability to pay): “Income, however, is the most frequently used basis. State personal income is presumably the best measure of ability to pay. This is consistent with taxation systems throughout the developed world, which are generally based on income and/or consumption, which depends on income” (p. 221). Extending the ability to pay idea further, when linked to state higher education appropriations, this measure therefore becomes a measure of a state’s *effort* in supporting higher education relative to its available tax base or wealth (Archibald & Feldman, 2006; McLendon, Hearn, et al., 2009; Mortenson, 2005).

Analyzed using this measure, state support for (or effort in regard to) higher education has been declining fairly steadily for over 30 years (see Fig. 13.11).²⁰ This changed in the late 2000s with personal income dipping sharply in 2008 and state tax fund appropriations for higher education increasing significantly since the mid-2000s with that upward slope only moderating slightly in 2008 (when federal stimulus funds are included).

When interpreting what a change in state funding for higher education per \$1,000 of personal income means, researchers are making the assumption that the income elasticity of nominal higher education appropriations equals one, and this assumption may not be entirely accurate (Archibald & Feldman, 2006). Additionally,

²⁰ The mid-1970s represented a high point for this measure. In 1960, the states appropriated just over \$3.00 for every \$1,000 of personal income.

Archibald and Feldman point out that when this dependent variable is employed, the researcher cannot use nominal personal income as an independent variable. However, these authors argue that there is no clear rationale for why nominal income would impact state funding for higher education per \$1,000 of personal income.

Researchers must be cognizant when using this measure as a dependent variable of state support for higher education (or any of the other measures discussed here) that they employ accurate language and interpret their results carefully. Once state funding of higher education is adjusted by personal income, it becomes an entirely new measure, a measure of state effort relative to its tax base. Therefore, it would not be accurate to discuss the results in regard to the independent variables' impact on state funding of higher education as that is not the dependent variable, state effort is. Likewise, the researchers should construct their arguments and interpret their results keeping in mind both sides of the equation, higher education funding and personal income, and how the two components interact.

State Higher Education Spending as a Percentage of Total State Spending

State spending on higher education relative to total state spending has been used as a dependent variable in a variety of studies in the recent past (e.g., Dar & Spence, 2011; Tandberg, 2010a).²¹ Trostel and Ronca (2009) argue that total state spending ought to be categorized as an ability to pay variable, in that it highlights the total available resources for expenditure of the state. This would make higher education spending relative to total state spending a measure of higher education effort.

As Fig. 13.12 reveals, using two different data sources (Census and NASBO), state higher education spending as a percentage of total state spending has fluctuated over the past 20 years, with a significant dip in the late 1980s and early 1990s. As discussed earlier, the NASBO data again shows greater variability and more dramatic fluctuations.

There are several reasons why researchers might employ this measure as their dependent variable. First, it allows the researcher to control for general increases or decreases in state spending and therefore isolates the specific relationship each independent variable has with spending on higher education. Second, using state higher education spending as a percentage of total state spending may enable the researcher to capture different dynamics of the state budgetary process than other measures of state support of higher education. For example, states are generally

²¹ Rizzo (2004) uses a similar measure(s) however his conceptualization led him to develop three dependent variables:

1. EDShare – Education's share of total state expenditures
2. HEShare – Higher education's share of total state education expenditures
3. InShare – Institution's share of total state higher education expenditures

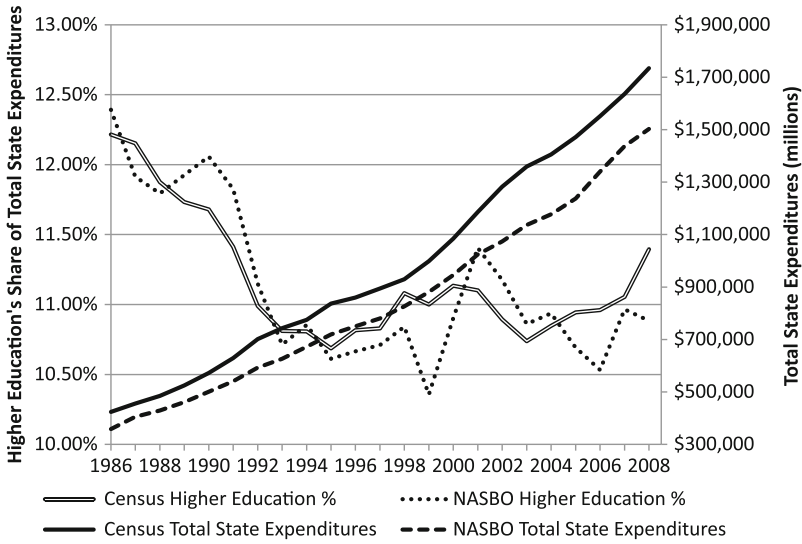


Fig. 13.12 Higher education's share of total state expenditures (Source: U.S. Census, NASBO; Calculations: Authors')

required to balance their budgets. Therefore, an increase in one area often necessitates a decrease in another because of state policymakers' reluctance to increase taxes. Using this variable as the dependent variable in a regression equation may capture that tradeoff. Furthermore, the decision regarding which area gets how much funding is a political one involving give-and-take between interest groups, individual actors with their own interests and attributes, and numerous other factors. This variable may help capture that complex dynamic. In this regard, state higher education spending as a percentage of total state spending may better highlight the internal budgetary and political factors that influence the decision making of state policymakers as they decide how they will support higher education relative to other major state expenditure areas (Dar & Spence, 2011; Tandberg, 2010a).

However, Trostel and Ronca (2009) argue that, especially when used for descriptive and comparative purposes, state higher education spending as a percentage of total state spending can be a deceptive measure as it can change for reasons unrelated to state postsecondary education funding. As states increase funding in one area and nothing else changes, the percentage higher education receives will go down, even if funding for higher education remains unchanged (funding for higher education could even go up, but if funding for other areas increases more dramatically, higher education's share would go down). This is of interest to higher education researchers as a significant portion of state budgets are made up of case load-driven categories such as Medicaid, corrections, and K-12 education. Higher education is seen as discretionary and capable of generating its own revenue (i.e., tuition and fees).

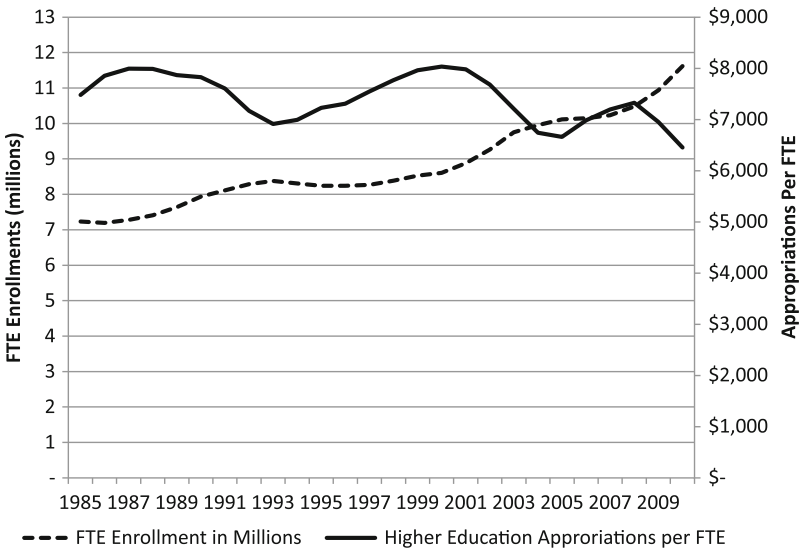


Fig. 13.13 State higher education appropriations per FTE (Source: SHEEO (SHEF’s Education Appropriations and FTE measures); Calculations: Authors’)

State Funding of Higher Education per FTE Student

State funding of higher education per FTE has been employed as a dependent variable in a number of studies and may, in fact, be the most commonly used measure (e.g., Bailey, Rom, & Taylor, 2004; Cheslock & Gianneschi, 2008; Humphreys, 2000; Koshal & Koshal, 2000; McLendon, Mokher, & Doyle, 2009; Nicholson-Crotty & Meier, 2003; Peterson, 1976; Strathman, 1994). As displayed in Fig. 13.13, state higher education support per FTE has followed a wave pattern with reductions and then commensurate recoveries, until the 2000s where the reduction was followed by a much smaller recovery. Additionally, every successive low point in the chart is lower than the last, with the end point of the chart representing the lowest point on the trend line. The significant dip beginning around 2008 seems to be driven, along with the “Great Recession,” by a rapid increase in enrollments.

Trostel and Ronca (2009) classify FTE enrollments as being a gauge of need for funding. Clearly, the more students, the greater the need for financial support from the state. Therefore, the combined measure of FTE enrollments and state appropriations would serve as one way of assessing adequacy. While higher education appropriations per FTE is one of the most popular dependent variables in studies of state support of higher education, Trostel and Ronca raise some concerns about its usage for descriptive time series and comparative purposes. Their primary concern is one of endogeneity. Specifically, increased state funding for higher education may drive increases in enrollments. The authors are right to be concerned about endogeneity;

however, others have investigated this idea, and while there does appear to be an endogeneity problem, the direction of the effect is in the opposite direction of Trostel and Ronca's concerns, with enrollments appearing to drive funding more than funding drives enrollments. Various authors (Clotfelter, 1976; Hoenack & Pierro, 1990; Leslie & Ramey, 1986; Toutkoushian & Hollis, 1998) have found an enrollment elasticity of around 1.0 (with a range of .85–1.55). This means that a 1% increase in enrollments results in approximately a 1% increase in appropriations. This makes sense as public college and university presidents frequently use the existence of increased enrollments as a way to justify requests for increased appropriations. Additionally, state higher education funding formulas generally include enrollments as an important factor. In fact, both Leslie and Ramey (1986) and Toutkoushian and Hollis (1998) found some evidence that the enrollment effect was even more pronounced in states where funding formulas are used to distribute state funds to postsecondary institutions.

As noted, Trostel and Ronca (2009) raise some important concerns about the FTE measure when used for descriptive and comparative purposes; however, it appears that, while endogeneity is inherent in the measure, the stronger relationship runs in the opposite direction to that with which they are concerned. Likewise, including enrollments as part of the dependent variable is one way of controlling for its effects. More importantly however, while Trostel and Ronca suggest an alternative measure of need, which will be discussed next, enrollment remains the only direct and immediate measure of need available to researchers.

Trostel and Ronca's (2009) "Unifying Measure of State Support for Postsecondary Education"

Trostel and Ronca (2009) address a persistent issue in the state higher education finance discussions, which is the disagreement over how to measure state support for higher education. As Longanecker (2006) reveals, and the charts above show, the levels of support and the trajectory over time vary significantly depending on how they are measured. Those who desire to show that state support for higher education has decreased have been able to find measures to support their case. Likewise, those who want to show that support has remained steady or increased have likewise been able to find measures to support their case (though, due to the recent recession and increasing enrollments, finding such measures has become increasingly difficult). In an effort to minimize such disagreements and confusion, Trostel and Ronca set out to develop a unified measure of state support for higher education and in the process correct for any deficiencies in other established measures.

As indicated earlier, Trostel and Ronca (2009) categorize the various normalizing variables into two categories: ability to pay and need. They argue that state per capita personal income is the best ability to pay measure and that the number of high school graduates over the last 4 years is the best measure for need. As previously discussed, the reason they suggest high school graduates instead of current

postsecondary enrollments is primarily because of concerns about the endogeneity of state higher education funding and current enrollments.²² The resulting index of state support for postsecondary education is a measure of need relative to ability to pay and is calculated by dividing their need-based indicator (total number of high school graduates over 4 years) by their ability-to-pay indicator (state per capita income). State funding for higher education is then divided by the result of the need relative to ability to pay equation. In the equation below, F equals state funding, i equals state per capita income, S equals state support, G equals high school graduates over the previous 4 years, t represents time, k represents state, and s represents year:

Equation 1: Unifying measure of state support for postsecondary education

$$S_{kt} = \frac{F_{kt}}{i_{kt} \sum_{s=t-4}^{t-1} G_{ks}}.$$

Source: Trostel and Ronca (2009), p. 225

The authors suggest that the final index best captures the concept of “state support” of higher education. The majority of the article is spent justifying their use of total number of high school graduates over the previous 4 years as a proxy for need. This is appropriate as the idea is not without its own apparent weaknesses. The authors directly address various possible weaknesses with their measure and provide some data to address them. A few of the most important of them will be discussed here.²³ The authors concisely state their primary assumptions in regard to this measure in this way:

Thus, in summary, states’ number of potential traditional, four-year, in-state college students is conservatively assumed to be proportional to their total need for public support for postsecondary education (i.e., the sum of the needs from research, public service, nontraditional students, graduate education, etc.). (Trostel & Ronca, 2009, p. 225)

These assumptions are based on a variety of factors. Using national data, the authors show that the rate of students going directly from high school to college has remained fairly steady from 1992 (65.5%) to 2006 (65.8%), although it has increased since. They also show, again using national data, that the majority of students in college are undergraduate students and the proportion has only changed slightly from 1980 to 2006; that a slight majority of students enroll in four-year institutions (something that has remained fairly consistent since 1980); and that the ratio of GEDs to high school diplomas varies significantly year to year. Therefore, from a national perspective, while it is not a perfect proxy (e.g., it ignores adult students and those who enter with a GED, and around 35% of high school graduates are not entering college right away, not to mention needs for graduate education and research capacity), the

²² For a full discussion of their concerns, please see Trostel and Ronca (2009).

²³ For a full discussion, please see Trostel and Ronca (2009).

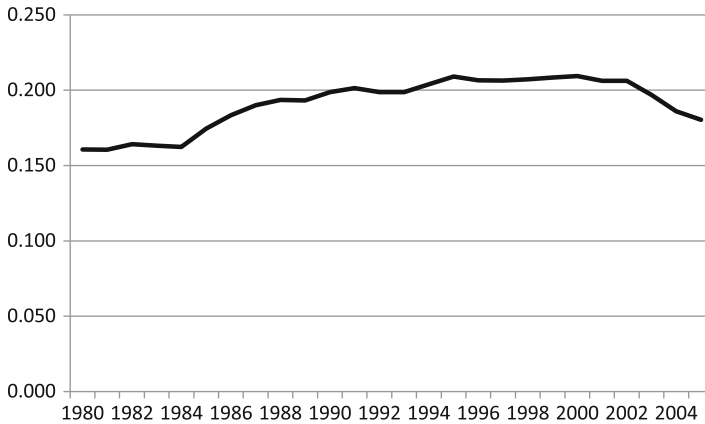


Fig. 13.14 Trostel and Ronca's (2009) "Unifying Measure of State Support for Postsecondary Education" (Source and Calculations: Trostel and Ronca)

authors make the case for it being a reasonable proxy and one that avoids any endogeneity issues. Further, it is the only measure that takes both need and ability to pay into consideration.

The real issue is at the state level where there are very large differences between states in rates at which students enter college immediately after college, their adult participation rates, proportion of students enrolled in private institutions, the ratio of students enrolled in two-year institutions to those enrolled in four-year institutions, their GED programs, the rate at which students stay in state or go out of state for college, etc. For example, 45.7% of high school graduates go directly to college in Alaska, and in Mississippi, the figure is 77.4%. The result of these differences is that in some states, the need will be significantly overstated by the proposed measure while in other states the need will be significantly understated. Therefore, the measure may be of limited use for cross-state comparison purposes.

Based on the Trostel and Ronca (2009) measure, state support of higher education increased fairly rapidly starting in 1983, plateaued somewhat through the 1990s and then began declining in the early 2000s. This pattern is significantly different than appears in any of the other measures. This difference is logical due to the fact that this measure is the only one to take both need and ability to pay into account (Fig. 13.14).

Similar to the choice of data source, when it comes to the measures employed, researchers ought to think carefully about the phenomenon they are interested in assessing and carefully choose the appropriate measure of state support and provide some justification for and explanation of their choice in relation to their research questions. The measures can tell dramatically different stories; therefore, it makes sense that they are impacted by different forces which can and do result in significantly different findings.

Theories and Frameworks

This chapter focuses directly on the program spending patterns of state governments and specifically analyzes state support of public higher education. In so doing, appropriations and expenditures are seen as manifestations of institutional (governmental) commitments. State spending is one important measure of the relative salience that state-level public officials accord to various social and political issues – in this case, to state public higher education (Baumgartner & Jones, 1993). In other words, patterns of spending represent the “governmental decision agendas” within the respective states (Kingdon, 1995). By analyzing appropriations and expenditures, researchers focus on the tangible distribution of public resources and not merely on the intentions of politicians and office holders, because adequate financing is a necessary precondition for any meaningful policy activity (Garand & Hendrick, 1991). As such, expenditure commitments are the targets of those who aim to influence government (e.g., parties and interest groups, as well as individual citizens). Furthermore, state budgeting has a profound effect on the ways that state governments ultimately address issues and ameliorate social problems. In short, policy spending represents a critical concept deserving of attention from political scientists and issue-specific policy scholars and analysts.

In line with Kingdon’s (1984) and Baumgartner and Jones’s (1993) means of conceptualizing governmental expenditures, Jacoby and Schneider (2001) define state policy priorities as “the component of governmental decision-making in which public officials allocate scarce resources, in the form of expenditures, to different program areas” (p. 545), essentially the budgetary process. Policy research has several well-developed theories to explain the policy process and policy outputs. Since appropriations decisions are processed through the same system and organization as other policy decisions, it seems natural to assume that general policy theoretical frameworks may also be applied to state budgetary research.

This section will begin by reviewing two popular ways of understanding the behavior of political actors and government behavior: the median voter theorem and new institutionalism. The review of new institutionalism will naturally lead to a discussion of two frameworks that developed out of the new institutionalism school of thought. The first was developed by Elinor Ostrom (1991, 1999) and is referred to as the institutional rational choice framework. The second takes off from Ostrom’s framework and adapts it to state funding of higher education. This section will conclude with a discussion of principal-agent theory, which also has its roots in new institutionalism.

Median Voter Theorem

The median voter theorem is a widely utilized model among researchers attempting to explain elected official decision making. The theorem argues that when running

for office, politicians will attempt to maximize their number of votes by committing to the policy position preferred by the median voter. Likewise elected politicians will attempt to position themselves on policy and finance issues nearest the preferences of the median voter for fear of not being reelected. From the perspective of the median voter theorem, the preference of the median voter dominates the preferences of the electorate and therefore drives the actions of popularly elected officials. Of course, the central assumption of the theorem is that the primary motivation driving politicians' behavior is a desire to be reelected (Black, 1948; Coughlin & Erikson, 1986; Downs, 1957; Holcombe, 1989).

When applying the median voter theorem to state funding of higher education, researchers face a particular challenge in that it can be difficult to determine what the median voters' preferences are in regard to higher education *a priori*. Nevertheless, several scholars have utilized the median voter theorem when examining state higher education funding decisions (e.g., Borchert & Deacon, 1972; Clotfelter, 1976; Doyle, 2007; Tandberg & Ness, 2011; Toutkoushian & Hollis, 1998). Toutkoushian and Hollis use the median voter theorem as a way of establishing a theoretical link between various state economic and demographic factors (including postsecondary enrollments) and legislative demand for higher education, exhibited through state appropriations. The authors essentially make the implicit argument that, for example, since their regression analysis reveals that as state median income rises, so too does legislative demand for higher education (increased appropriations for higher education), and therefore, it can be deduced that as the income of the median voter increases, he or she prefers increased appropriations for higher education.

Doyle (2007) extends the discussion of the median voter theorem and state support of higher education further by using the theorem as a way of examining the relationship between income inequality, income redistribution, and state support of higher education. Doyle adapts a model developed by Fernandez and Rogerson (1995), which argues that, from the perspective of the median voter theorem, median voters with greater than average income will prefer lower taxes and general subsidy rates and that the opposite should hold true for median voters with less than average income. Doyle then goes on to argue that as income inequality increases (increased wealth concentration among those with greater than average income), support for increased spending on higher education should decrease. Doyle's empirical test finds support for this theory, as he finds that, holding other factors constant, increased inequality leads to lower appropriations for higher education.

Doyle (2007) argues that the median voter theorem and the results of his analysis reveal that appropriations for higher education are not driven entirely by a simple mathematical formula which takes into consideration last year's appropriation, this year's available resources, and the needs of higher education (i.e., enrollments), but are instead, at least partially, driven by elected officials attempting to maximize their reelection chances and an electorate attempting to "exclude certain parts of the population from attendance in higher education" (p. 401).

Doyle's (2007) application of the median voter theorem for higher education and the results of his study may help researchers better interpret certain results and also

develop more sophisticated models. For example, it might be illuminating to interact a measure of voter turnout with income inequality. Theoretically, greater voter turnout should magnify the effect of income inequality as increased turnout should force elected officials to be even more cognizant of the desires of the electorate. The median voter theorem can help researchers understand the relationship between a host of measures of state population attributes including, for example, political ideology measures and age group shares (McLendon, Hearn, et al., 2009; Toutkoushian & Hollis, 1998; Dar, 2012). The median voter theorem, however, is not as helpful when it comes to helping researchers account for system level attributes of the political and governmental systems.

New Institutionalism

Increasingly, recent research has highlighted political institutions' influence on state budgetary practices and outputs (e.g., Alt & Lowry, 1994; Barrilleaux & Berkman, 2003; Jacoby & Schneider, 2001; Thompson & Felts, 1992; McLendon, Hearn, et al., 2009). Even some of the early foundational research on incrementalism provided some evidence of the effect of institutions on budgetary outputs (Sharkansky, 1968). Of particular interest to this study is what has been termed "new institutionalism" (March & Olsen, 1984; Shepsle, 1979, 1989). New institutionalism is more of a general perspective on social behavior than a specific theory. In fact, the perspective encompasses numerous theories, such as institutional rational choice, normative (or sociological) institutionalism, and historical institutionalism. Many other theories within policy research have been birthed or heavily influenced by new institutionalism, even though some do not have the word "institutionalism" in their names (Sabatier, 1999).

Used within the context of new institutionalism, the term "institution" is broadly defined to include the formal and informal rules, norms, and strategies of an organization; shared concepts used by actors in repetitive situations; plus the formal organizations and structures of government and public service. Even more broadly, institutions might include patterns of behavior, negative norms, and constraints (Coriat & Dosi, 1998; Ostrom, 1999). Institutionalists argue that institutions define the goals, meaning, and actions of individuals who are interacting within governments and therefore impact the decisions and outputs of governments. March and Olsen (1984), when discussing new institutionalism, succinctly assert that institutionalism "is simply an argument that the organization of political life makes a difference" (p. 747).

Shepsle (1989) explains new institutionalism in this way: "Like the rational choice theories that preceded them, and in contrast to the older institutional traditions ... these efforts are equilibrium theories. They seek to explain characteristics of social outcomes on the basis not only of agent preferences and optimizing behavior, but also on the basis of institutional features" (p. 135). In viewing institutions more widely, that is, as social constructs, and taking into account the influence that insti-

tutions have on individual preferences and actions, new institutionalism has moved away from its pure institutional (formal, legal, descriptive, and historical) roots and has become a more explanatory discipline within political science and policy research. This wide-angle view has also extended to budgetary research. Kiel and Elliott (1992) explain that a proper understanding of budgeting must consider the relationships between relevant institutional actors and other exogenous forces.

The new institutionalism perspective has recently migrated to the state higher education policy and finance literature. It has been used, often in combination with other perspectives, to explain state political actors' higher education policy decisions (e.g., Cornwell, Mustard, & Sridhar, 2006; Doyle, McLendon, & Hearn, 2010; McLendon, Deaton, & Hearn, 2007; McLendon, Hearn, & Deaton, 2006; McLendon, Heller, & Young, 2005; McLendon, Mokher, & Flores, 2011). It has also recently been used in efforts to predict state support of higher education (e.g., Dar & Spence, 2011; McLendon, Hearn, et al., 2009; Nicholson-Crotty & Meier, 2003; Rizzo, 2004; Tandberg, 2010a, 2010b; Weerts & Ronca, 2006). The new institutionalism perspective has helped scholars move away from seeing state support of higher education as being driven entirely by economic- and higher education-related factors to also being affected by various political and governmental institutions and other political characteristics of the states. As will be discussed in greater detail later, the inclusion of various political factors in predictive models of state support of higher education has been a fruitful development as many of the political variables have been proven to be significant predictors and to operate in theoretically predictable ways.

Institutional Rational Choice Framework

While there has existed significant debate about the merits of rational choice theory versus new institutionalism, there has also been convergence of the two ideas in a framework offered by Elinor Ostrom. She argues that the two schools of thought converge at key elements of the choice process. As she explains: "To offer coherent rational choice explanations of complex institutional behavior, however, requires a deep understanding of the logic of institutions and institutional choice. Thus, rational choice and institutional analysis are likely to be essential complements in the political science of the twenty-first century" (1991, pp. 242–243).

While Ostrom is not the only scholar to merge elements of rational choice theory and institutionalism (Dowding & King, 1995; Grafstein, 1992), hers is perhaps the most influential. Ostrom calls her framework institutional rational choice (IRC). IRC is a general analytic framework that stresses how various norms, rules, structures, and strategies affect the internal incentives confronting individuals. IRC argues that actions are a function of the attributes of the individuals (e.g., values and resources) and the attributes of the decision situation (Kiser & Ostrom, 1982; Ostrom, 1991, 1999). The latter is a product of institutional rules, the nature of the relevant good(s), and the attributes of the community/environment (Kiser & Ostrom, 1982; Sabatier, 1991). Rational choice institutionalism sees institutions as evolving

over time as politicians seek to remake them in order to further their own interests (Geddes, 1994, 1996; North, 1990).

A central focus of the IRC is the decision situation (or action arena). The decision situation is in the “social space where individuals interact, exchange goods and services, engage in appropriation and provision activities, solve problems, or fight” (Ostrom et al., 1994, p. 28). Within the decision situation, participants “must decide among diverse actions in light of the information they possess about how actions are linked to the potential outcomes and the costs and benefits assigned to actions and outcomes” (Ostrom et al., p. 29). Institutional rational choice scholars view choice and incentives as being shaped in a significant way by the presence of rules governing the negotiations within the decision situation and also the monitoring and enforcement of consensual agreements (Ostrom, 1992).

While the IRC has received limited attention in the higher education policy literature (i.e., Richardson, Shulock, & Teranishi, 2005; Shakespeare, 2008) and in the state higher education finance literature (Tandberg, 2010a, 2010b), the framework may prove quite useful. The advantages of Ostrom’s framework to those interested in learning about the factors influencing state funding decisions for higher education are that it enables the researcher to isolate the decision-making process of the political actors involved in the process and opens the process to the effect of its context, including history and culture. Likewise, the framework isolates the possible effect of the action arena or decision situation for higher education funding. For example, it brings attention to the possible motivation and attributes of those directly involved (within the decision situation) in making the appropriations decisions (e.g., legislators, governors, and perhaps state governance structure officials), those trying to influence those individuals (colleges and universities and competing interests), institutions (various norms, rules, structures, and strategies) of the decision situation (e.g., does the state use a funding formula? How professionalized is the legislature?), and the history and culture of higher education and higher education finance in each particular state. Employing the IRC forces researchers to take a much broader view of the possible factors influencing state finance of higher education, going well beyond last year’s appropriation amount, enrollments, and the influence of a few economic and demographic factors.

State Fiscal Policy Framework

Tandberg (2010a, 2010b) took Ostrom’s framework and adapted it using previous research on state higher education support and research on interest groups to help explain state support of higher education. This framework is displayed in Fig. 13.15. Similar to other frameworks, Tandberg’s makes the assumption that the decisions of elected officials are a function of their individual attributes and the attributes of others involved in the decision process (e.g., values and resources) and also the attributes of the decision situation. The framework suggests that it is within those constraints that actors weigh the expected benefits and costs of their possible actions prior to making

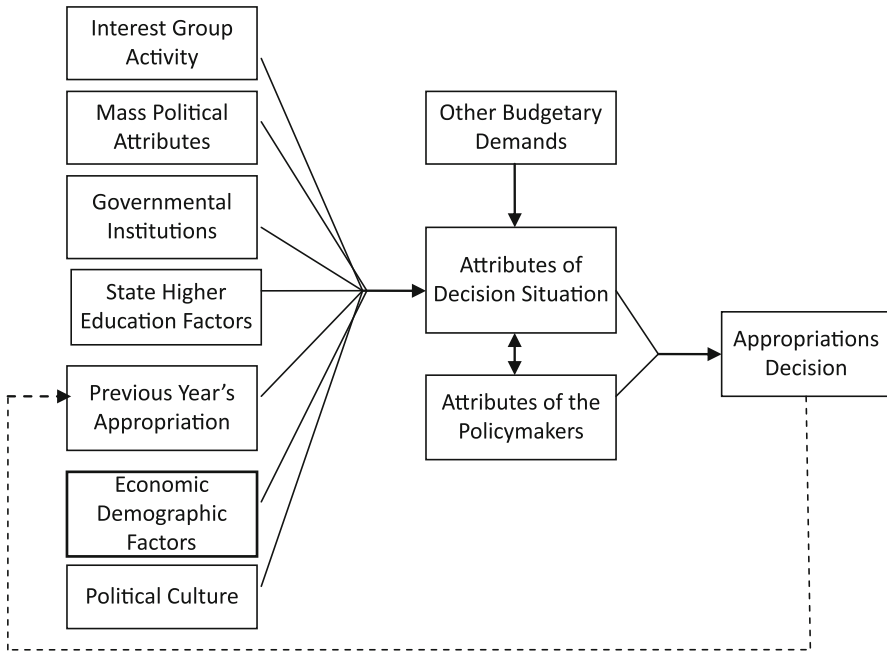


Fig. 13.15 Fiscal policy framework (Source: Tandberg 2010b, Copyright _ 2009, SAGE Publications)

a decision. They then choose the option that best serves their interests. Borrowing from new institutionalism, the framework assumes that various norms, rules, structures, and strategies affect the internal incentives confronting state political decision makers and influence their resulting behavior. These factors are categorized in the following way: political culture, economic-demographic factors, mass political attributes, governmental institutions, and attributes of the policymakers.

The model also accounts for the influence of other state budgetary demands and the potential impact of state interest group activity (Garand & Hendrick, 1991; Gray & Lowery, 1996; Sabatier, 1999). Likewise, the model accounts for the previous year's appropriation and the influence of higher education sector factors. Finally, the model also allows for interactions to occur between various actors and influences as they converge in the attributes of the decision situation.

Tandberg (2010a, 2010b) has examined the applicability of this framework and found that individual variables fitting within each of the categories described above have significant and theoretically predictable influences on state support of higher education measured in two different ways: state tax appropriations for higher education (Grapevine) per \$1,000 of personal income and share of state general fund expenditures devoted to higher education (NASBO). Among such variables are citizen political ideology, interest group activity, partisanship of the governor and the

legislature, legislative professionalism, centralization of the state governance structure for higher education, income inequality in the state, institutional fundraising, and others (several of these variables will be discussed in greater detail later in the chapter). While this framework does not function as a predictive model, it can help researchers to frame their studies and think about and account for the multiple factors which influence state support of higher education.

Principal-Agent Theory

As McLendon (2003) suggests, principal-agent theory provides a useful conceptual lens through which facets of political control of the state higher education institutions and bureaucracy can be examined. In general terms, principal-agent theory helps researchers understand the relationship between two or more parties in which one party (the principal) engages another party (the agent) to perform some task or service on the behalf of the principal (Eisenhardt, 1989; Ross, 1973; Moe, 1984). Within an established principal-agent relationship, both parties are assumed to be self-interested actors, and therefore, their preferences often diverge. This results in goal conflict between the parties. Additionally, these relationships are plagued by informational asymmetries which generally favor the agent. These conditions compel the principals to invest resources in monitoring the behavior of agents in an effort to control their behavior. How the various actors manage their relationships and individual interests are primary concerns of principal-agent theorists and researchers (Moe, 1987).

Within state higher education systems, principals include elected officials (both legislative and executive) and to a greater or lesser extent (depending on the state) state-level governance structures. The agents are the public institutions themselves who have been contracted (by their state charters and their annual appropriations) to provide educational services to the state. The complex relationship between higher education institutions and state government provides theoretically and empirically rich soil for the investigation of principal-agent relationships. As McLendon (2003) explains: "Principal-agent perspectives provide a useful starting point for conceptualizing how and why elected officials seek control of state higher education agencies, how agencies respond to political control, and in what ways agency structure influences policy implementation" (p. 174). Additionally, the principal-agent perspective can shed new light on the appropriations process for higher education. Possible areas for investigation might include the following: How agency structures might influence the process or rules and levels of funding; how greater or lesser state oversight and control may impact support for higher education; how greater gubernatorial, legislative, or state governance agency power might alter state support; and how principals and agents might attempt to use, manipulate, or alter the annual appropriations process to further their own self-interest in a number of ways not limited to level of funding.

Indeed, recently, a growing number of researchers have been integrating principal-agent theory into the study of higher education policy and governance

(e.g., Kivisto, 2005, 2007; Lane, 2003, 2005, 2007; Lane & Kivisto, 2008; McLendon et al. 2006; Payne, 2003; Payne & Roberts, 2004).²⁴ Additionally, several scholars (even if they have not cited principal-agent theory by name) have examined the impact of state-level governance structures on state support of higher education (e.g., McLendon, Hearn, et al., 2009; Tandberg, 2010a, 2010b). Nicholson-Crotty and Meier (2003) and Tandberg (2010c) further advanced these analyses by examining how state-level governance structures condition the impact that other political variables have on state support of higher education. Despite these recent endeavors, there is certainly more to be learned through the application of principal-agent theory to the appropriations process for higher education.

Literature Review

The literature on explaining and predicting state support of higher education has progressed through a series of stages as conceptual understanding, methods, and data have all advanced and improved. This section will discuss these trends and along the way highlight some of the more important studies. This section will also review some innovative findings in regard to specific independent variables.

Two studies published in the mid-1970s by several political scientists (Lindeen & Willis, 1975; Peterson, 1976) proposed relatively broad conceptualizations of the possible factors influencing state funding decisions for higher education.²⁵ Both studies accounted for various political, demographic, and economic factors. In both cases, they found that the economic and demographic factors have a large impact on state support measured multiple ways but perhaps more interesting is that they also found that various political variables have a significant impact on state support. These included such variables as voter turnout, measures of governmental innovation and governmental centralization, legislative conflict, interparty competition, governors' powers, and legislative professionalism. Both studies used cross-sectional data (state-level data from single years) and basic methods such as descriptive statistics, correlation analysis, and simple linear regression. Nevertheless, their findings suggested that the state budgetary process for higher education was open to be influenced by various demographic and economic factors and also various political factors. It was not until much later that the politics of state funding of higher education again received any significant attention.

Researchers' perspective took an interesting turn in the 1980s and 1990s as they abandoned the approach of Lindeen and Willis (1975) and Peterson (1976) and instead viewed factors influencing state support of higher education more narrowly.

²⁴ For an extensive review of principal-agent theory and its application to higher education, see Lane and Kivisto (2008).

²⁵ Lindeen and Willis's (1975) primary dependent variable was total expenditures per tax payer, and their data source was the precursor to the IPEDS survey, the Higher Education General Information Survey. Peterson's (1976) primary dependent variables were appropriations per capita and per student, and his data source was also the Higher Education General Information Survey.

In fact, Layzell and Lyddon (1990) concluded that the only significant predictor of current state higher education appropriations were past appropriation levels. Similarly, Hossler et al. (1997)²⁶ found that public higher education enrollments and previous appropriation levels were the only significant predictors of current state higher education appropriations. However, cross-sectional data were utilized, which means that their sample size was at most an n of 50. Such a small sample size means that it would have been very difficult for any of the individual independent variables to reach statistical significance, which may have limited their findings.

Later, attention returned to the possible impact of state economic, demographic, and higher education sector variables. One of the first studies to return to this broader view of the factors influencing state support of higher education was Toutkoushian and Hollis (1998).²⁷ The authors employed panel data covering the year 1982–1996 for all 50 states. They also employed a fixed effects model which allowed them to isolate the impacts of state and year effects from the effect of the independent variables. Finally, for one of their models, they employed a two-stage least squares approach which allowed them to treat enrollments as endogenous and obtain accurate estimates of their elasticity with respect to appropriations. The authors found that indeed state funding of higher education is significantly impacted by various economic and demographic factors, that enrollments also affect state appropriations, and that state funding formulas generally have a significant positive impact on levels of funding. Other researchers later reported similar findings (Kane et al., 2003; Kane, Orszag, Apostolov, Inman, & Reschovsky, 2005; Okunade, 2004; Toutkoushian & Hollis, 1998). These latter studies revealed the influence of a variety of demographic-, economic-, and higher education-related variables, including unemployment levels, population size, other state budgetary demands (i.e., Medicaid), and public and private sector enrollments.

In the 2000s, attention returned to the possible influence of state-level political influences on state support of higher education (Archibald & Feldman, 2006; Lowry, 2001; Nicholson-Crotty & Meier, 2003; Rizzo, 2004; Weerts & Ronca, 2008). For example, Archibald and Feldman found democratic control of the lower chambers of state houses and of governors' offices to be positively associated with funding levels and likewise found that liberal states were more generous toward higher education. Rizzo found Republicans and unified party control of the legislature were negatively associated with the share of state education budgets allocated to public higher education. Additionally, Weerts and Ronca found that partisanship of the governor (Republican – yes/no) and the legislature (percentage of Republicans) and voter turnout were significantly associated with state support of higher education.

Most recently, three studies have significantly expanded our understanding of the role of politics and political institutions in influencing state support of higher education. Borrowing theory and measures from political science, McLendon, Hearn et al. (2009)

²⁶ Hossler et al. (1997) used levels of state appropriations to public four-year institutions. The data were from the Grapevine surveys.

²⁷ Toutkoushian and Hollis (1998) used the natural log of state appropriation levels as their dependent variable. Their data source was the precursor of the SHEEO SHEF compilation, the *State Profiles: Financing Public Higher Education* data collected by Kent Halstead.

and Tandberg (2010a, 2010b)²⁸ engaged in similar analyses, and their results taken together also showed that partisanship of the governor and the legislator were significantly associated with state support of higher education, but also that legislative professionalism, whether the state had term limits, gubernatorial powers, the impact of interest groups (measured a number of different ways), political ideology, the existence of a unified legislature and a consolidated state governing board for higher education, and political culture²⁹ all significantly impacted state support for higher education. These authors' models also included a number of economic-, demographic-, and higher education-related independent variables that were found to play a role. Finally, and most recently, research by Dar (2012) has significantly improved our understanding of political ideology and states' trend toward greater privatization of public higher education.

Independent Variables

Appendix A provides basic information on over 30 different studies meant to account for state support of higher education. There may have been additional studies published that were missed; however, this is believed to be a fairly comprehensive listing of the studies published since 1980 (plus a few published in the 1970s).³⁰ Researchers can use Appendix A to determine, for each of these studies, which variables have been used in past research; which independent variables have been found to be significant predictors of state support measures, the direction of the effect; and which dependent variable(s) – that is, which measures of state support for higher education – they have been associated with, the years covered and related sample information, the empirical approach, and other methods employed.

There have been many independent variables employed to explain some measure of state support of higher education. Some of those variables measure aspects of the higher education systems in the states; others measure various political attributes of, and aspects of the governmental systems in, the states; and some of the more traditional variables can be categorized as economic and demographic variables.

Of the various independent variables that have been evaluated for their possible impact on state support of higher education, this section will only focus on several key variables that fall within the political category. This area is chosen for special focus because it has only recently received significant attention, and this attention

²⁸ McLendon, Hearn et al. (2009) employed state tax appropriations per \$1,000 of personal income as their dependent variable (Grapevine data). Tandberg (2010b) likewise used the same variable and Grapevine data. Tandberg (2010a) employed higher education's share of total state general fund expenditures as his dependent variable (NASBO data).

²⁹ See Tandberg (2010a, 2010b) and Hero and Tolbert (1996) for details on the political culture measure.

³⁰ We apologize for any studies we missed and for any inaccuracies in Appendix A. They were not intentional.

has led to important new findings that have caused researchers to reconsider state finance of higher education. The variables/factors from this political category that will be discussed are interest groups, state higher education governance structures, and legislative professionalism. All three are worth considering for inclusion in future analytic efforts and also represent areas for future theoretical and empirical development.

Interest Groups

Interest groups remain a conceptually and empirically underdeveloped concept within the larger state higher education policy and finance literature. Within political science, interest groups have been and remain a central and well-developed area of study. Political scientists have developed measures and theories which have led to significant findings in regard to the influence of interest groups on policy and finance decisions (e.g., Gray & Lowery, 1996, 2001; Nownes, 2006; Toma, Berhane, & Curl, 2006) but only recently has the higher education literature begun paying attention to this area of research (Ness, Tandberg, & McLendon, 2008).³¹

Truman (1951) defines an interest group as “any group that, on the basis of one or more shared attitudes, makes certain claims upon other groups in the society for the establishment, maintenance, or enhancement of forms of behavior that are implied by the shared attitudes” (p. 235). The members of such groups presumably establish shared attitudes, providing members a similar frame of reference for interpreting behaviors or events. In the context of American politics, Thomas and Hrebener (2004) describe an interest group as “an association of individuals or organizations or a public or private institution that, on the basis of one or more shared concerns, attempts to influence policy in its favor” (p. 102). Interest group research generally attempts to understand interest groups, their attributes and behaviors, and the influence they have on governments and policy outcomes or outputs. Interest groups attempt to influence governmental outcomes and outputs through direct and indirect lobbying activities (Thomas & Hrebener). While higher education is by no means the most influential lobby in the American states, as a sector, colleges and universities have become more influential over time (Nownes, Thomas, & Hrebener, 2008; Thomas & Hrebener, 1999, 2004), and there is reason to believe that, when it comes to issues particular to their sector (i.e., higher education appropriations), they can have a significant impact over governmental decision making (McLendon, Hearn, et al., 2009; Tandberg, 2008, 2010a, 2010b; Tandberg & Ness, 2011).

The majority of the work related to state-level interest groups and higher education policy and finance has been case study evaluations of interest group activity in one

³¹ For a detailed discussion of interest groups and state higher education policy research, see Ness et al. (2008).

or two states (e.g., deGive & Olswang, 1999; Frost, Hearn, & Marine, 1997; Ness, 2010; Sabloff, 1997; Tandberg, 2006; Tankersley-Bankhead, 2009). There have also been a few scattered survey-based studies (e.g., Blackwell & Cistone, 1999; Ferrin, 2003, 2005). These studies have revealed insights into coalition building, interest group alliances, the relative perceived influence of various actors and interest groups, and the activities of campus-based lobbyists. Only recently have higher education scholars turned their attention to the impact these groups have on governmental decision making.

Tandberg (2008, 2010a, 2010b) borrowed a widely used measure from the political science literature developed by Gray and Lowery (1996) which they refer to as a “relative density” indicator. Tandberg employed data provided by these authors and available in public archives to construct his measures of state interest group activity in regard to higher education. Both measures attempt to account for the wider interest group environment in the states, assume that interest groups compete for scarce resources, and assume therefore that the relative size of the higher education lobby matters. States with more interest groups may be less generous to higher education, and states with more powerful higher education lobbies may be more generous. The first measure is a higher education interest group ratio. This measure indicates the density of the higher education lobby relative to the larger interest group universe in a given state. It is a ratio that positions all higher education interest groups relative to all non-higher education interest groups. The variable is constructed by dividing the total number of state higher education institutions and registered noncollege or nonuniversity higher education interest groups by the total number of interest groups in the state minus the registered colleges and universities or other registered higher education interests groups that may lobby for higher education. The second is an interest group density measure, which attempts to measure the size of the total non-higher education lobby. It is constructed by taking the total number of registered interest groups minus the total number of registered higher education interest groups.³²

Using his measures, Tandberg (2008, 2010a, 2010b) found that the ratio of higher education interest groups to all state-level interest groups (state higher education interest group ratio) has a positive effect on higher education appropriations per \$1,000 of personal income, while the total number of non-higher education interest groups in a state has a negative effect on higher education’s share of total state expenditures appropriations. McLendon, Hearn et al. (2009) also found a positive effect of the total number of higher education interest groups in a state on higher education appropriations. Most recently, Tandberg and Ness (2011) found that Tandberg’s higher education interest group ratio is associated with increased state spending on higher education capital projects.

³² See Gray and Lowery’s (various years) extensive discussions on the use of interest group density measures.

The limited extant literature on interest groups and state higher education funding decisions supports the notion that interest groups matter in significant and measurable ways. Indeed, this is an area of research ripe for further exploration and development, including, for example, the exploration of lobbying strategies of institutions and their possible impact on levels of state funding for higher education and how differences in states' interest group ecologies (the mix of interest groups in a state) might impact their generosity toward higher education.

State Higher Education Governance Structures

All states have some sort of governance structure for higher education.³³ These structures are meant to provide some level of oversight and coordination of public higher education in the various states. However, the specific structure employed and the power granted to the structure differ from state to state. McGuinness (2003) developed a state governance typology based on (in descending order) strength of control: (1) consolidated governing board, (2) regulatory coordinating board, (3) weak coordinating board, and (4) planning agency. Consolidated governing boards and regulatory coordinating boards possess direct control over the academic and fiscal affairs of campuses. Weak coordinating boards and planning agencies' authorities are limited to reviewing campus policies and making recommendations to the legislature or governor. In this second group of governance models, decision authority is less centralized, which allows individual campuses to have far more autonomy (McGuinness, 2003; McLendon et al., 2005).

A growing body of literature supports the idea that the way a state arranges its higher education governance structure can influence the higher education policies the state pursues (Doyle et al., 2010; Hearn & Griswold, 1994; McLendon et al., 2005, 2006, 2007; Zumeta, 1996). A smaller group of studies have examined the impacts of governance structures on state funding for higher education (e.g., Lowry, 2001; McLendon, Hearn, et al., 2009; Nicholson-Crotty & Meier, 2003; Tandberg, 2008, 2010a, 2010b; Tandberg & Ness, 2011). While at least a couple have not reported significant results (McLendon, Hearn, et al., 2009; Tandberg, 2010a), these analyses have tended to find distinctive connections between postsecondary governance arrangements and financing levels. For example, Tandberg's studies reveal that the existence of a consolidated governing board for higher education

³³ Michigan does not have a traditional state-level coordinating or governing agency for postsecondary education. However, the State Board of Education has very limited state postsecondary coordinating functions. While its primary responsibility is for elementary and secondary education, the board does have limited responsibility for the coordination of services for public two-year and four-year colleges and universities. Vermont likewise does not have a traditional structure. Instead, it has a voluntary state higher education coordinating system plus two system level boards (McGuinness, 2003).

is negatively associated with state tax appropriations per \$1,000 of personal income and with state capital expenditures for higher education but is not significantly associated with the share of total state expenditures received by higher education.

Tandberg (2010c) and Nicholson-Crotty and Meier (2003) further highlight the role of state governance structures in influencing state funding decisions for higher education by examining their conditioning effect on other political factors and those factors' influence on state appropriations decisions. Tandberg found that indeed various political measures had differing impacts on state funding decisions in regard to size and direction depending on whether a state employed a consolidated governing board or not. State higher education interest groups' impact was muted, the influence of the governor was diminished, and the influence of the legislature was magnified (among other findings) with or without such a board. Nicholson-Crotty and Meier engaged in a similar analysis which likewise revealed conditioning effects of state higher education governance structures. Further analysis of the conditioning role of state higher education governance structures and new measures of governance structures themselves are possible areas for future research.

Legislative Professionalism

One of the political variables that has the most consistent and, in fact, largest impact on state support of higher education is legislative professionalism (e.g., McLendon, Hearn, et al., 2009; Nicholson-Crotty & Meier, 2003; Peterson, 1976; Tandberg, 2008, 2010a, 2010b; Tandberg & Ness, 2011). In each of these studies, legislative professionalism has been found to have a significant and positive impact on state support of higher education measured a number of different ways. Legislative professionalism represents the degree of institutional resources in the legislature (full-time staff, session length, and member pay) (Squire, 2000). There is substantial variation across states in terms of the professionalism of their legislatures, which makes the variable quite useful for empirical analyses. Legislative professionalism has been linked with higher public spending generally (Squire & Hamm, 2005) and, as indicated earlier, has specifically been found to positively impact spending for higher education, including higher education's share of total state expenditures (Tandberg, 2010a).

Legislative professionalism has been measured in two different ways. First, and most popular, is the Squire index. This is an index of the state legislature's average member pay, average days in session, and average staff per member relative to the US Congress (Squire & Hamm, 2005). A value of 1.0 indicates a perfect resemblance to Congress and therefore a high level of professionalism, while a value close to 0.0 indicates little institutional professionalism. McLendon, Hearn et al. (2009) utilized this measure. The second, utilized by Tandberg (2008, 2010a, 2010b;

Tandberg & Ness, 2011), simply uses the legislature's average pay. This approach has also been used in the political science literature for some time (e.g., Barrilleaux & Berkman, 2003; Carey, Niemi, & Powell, 2000; Fiorina, 1994). Either measure produces similar results.

The remaining question is why does legislative professionalism produce these results? We do not clearly know yet. However, Tandberg theorizes that there may be at least two possible reasons. First, more professionalized legislatures generally attract more educated members, who may be more sympathetic toward higher education and value it more highly. And second, McLendon, Hearn et al. (2009) and Tandberg (2010a), both recognize that the greater analytic ability of more professional legislatures may have something to do with the results. The basic argument is that more educated legislatures may value higher education more highly (Pascarella & Terenzini, 2005), as will legislatures with access to better information and resources, which may be more sympathetic toward higher education. Nevertheless, this is an area warranting further theoretical and analytical attention. As McLendon, Hearn et al. ask: "Why and how, precisely, does professionalism influence decision making in legislative bodies, particularly in the context of decisions about higher-education funding? Conceptually, why does professionalism seem to influence this particular kind of policy activity, i.e., state funding decisions, whereas previous studies have shown scant evidence of the effect of legislative professionalism in other areas of postsecondary policy?" (p. 700).

Methodological Advances

The most significant methodological development in the area of state finance of higher education is the creation of large-scale panel data sets and the use of fixed effects. Panel data sets greatly increase the analytical degrees of freedom by increasing the sample size. For example, a study utilizing data on all 50 states over the course of 20 years will have an n of 1,000. A simple cross-sectional study will only have an n of 50. The larger n dramatically increases the possibility of statistically significant findings. The larger n also frees the researcher to be able to include many more variables because of the increased degrees of freedom. This has led researchers to collect numerous economic-, demographic-, political-, and higher education- related variables, and the findings from these studies have significantly improved our understanding of the budgetary process.

In conjunction with the introduction of the panel data sets has come the use of fixed effects models. These models remove state-specific and time-specific effects from the coefficient estimates of the variables of interest. In other words, fixed effects allow researchers to control for unobservable characteristics about states and time that may impact state support for higher education. Generally, fixed effects are implemented within an ordinary least squares (OLS) model with the inclusion of dummy variables for state and/or time effects (Zhang, 2010;

Toutkoushian & Hollis, 1998).³⁴ Such a model, meant to predict state support of higher education and primarily focused on examining the role of politics, might look like this:

Equation 2: OLS fixed effects model

$$y_{it} = a + b_1 p_{st} + b_2 c_{st} + \tau_t + \delta_s + v_{st},$$

where y is the dependent variables (a measure of state support of higher education), a is the intercept coefficient, p_{st} represents the vector for various political variables, c_{st} represents the vector for various higher education and economic and demographic control variables, τ_t represents the year effects, δ_s represents the state effects, v_{st} is the pure residual, s and t are indices for individual states and time, and b_1 and b_2 represent the coefficients associated with the variables included in each vector.

Additionally, the use of interaction terms may continue to be a fruitful approach going forward. The use of interaction terms made the examination of the conditioning effect of state higher education governance structures, conducted by Tandberg (2010c) and Nicholson-Crotty and Meier (2003), possible (see above for a more detailed discussion). When an interaction term is created, the effect of two, or more, variables are not simply additive; instead, the effect of one variable depends on the value of another. Interaction terms are computed by multiplying the two main effect terms by each other. When a dummy variable for governance form is included in an interaction term (as they were in the Tandberg and Nicholson-Crotty & Meier studies), whether the results for the interaction terms are significant or not generally indicates whether there is a significant difference for states with and without a consolidated governing board for each political variable. For example, if the interaction term including budget powers of the governor and the dummy variable for higher education governance structure (coded 1 if such a board exists in a given state/year and 0 if not) is significant, then the difference between the results for different budget powers of the governor varies significantly depending upon whether a state is with or without a consolidated governing board. When employing interaction terms with a dummy variable, the final step is to split the sample based on whether each state/year has a consolidated governing board and then run two additional regressions: one including only those state/years coded 1 and one including only those state/years coded 0. This reveals the impact of the independent variables with and without the conditioning variable of interest (Tandberg).

A final methodological advance might be the use of two-stage least squares to address the possible endogeneity between various independent variables (i.e., enrollments) and state support of higher education (Toutkoushian & Hollis, 1998). Of course, there may be many other advances, and more will be developed if research in this domain continues. Indeed, the advancements in data and methods have been at the core of the recent expansion of our understanding of the factors that influence state support of higher education.

³⁴ See Zhang (2010) for a full discussion of the use of panel data in higher education research.

Conclusion

The data, measures, theories, literature, findings, and methods analyzed and reviewed in this chapter should provide a solid foundation for future empirical examinations of the factors associated with state support of higher education. Future researchers should be sensitive to the differences in the measures of state funding of higher education data depending on the source and its purpose. They should justify their decision in regard to their data source and provide a discussion of what the data includes and does not include. Likewise, researchers ought to think carefully about the phenomenon they are interested in assessing and carefully choose the appropriate measure of state support of higher education and provide some justification for, and explanation of, their choice. Researchers may want to consider one of the theories or frameworks reviewed here as they provide reasonable guides to, and explanations of, political decision making within a larger context and make room for the influence of politics and economic-, demographic-, and higher education system-related factors. They will also help researchers make better sense of their findings. The use of theory to guide research into the factors related to state support of higher education has, by and large, been sorely underutilized in the literature to date. Researchers also ought to carefully review and then build upon what has already been found in the literature to date. Hopefully, Appendix A will help in this regard. Researchers should consider utilizing and further investigating the three political variables discussed at length in this chapter (state interest groups, state higher education governance structures, and legislative professionalism) for there remains much to be learned about how they influence state support of higher education. Additionally, researchers ought to continue to explore research from other disciplines (e.g., public policy, public finance, political science, and economics) in order to investigate whether there are other variables of possible significance to add to the large panel data sets.

We need to learn more about the dynamics of the political decisions being made in regard to state support of higher education, and we need to arrive at better understandings and explanations for many of the relationships we have already observed. As indicated at the beginning of this chapter, state higher education funding impacts both access and quality and is therefore an issue of real social importance. Arriving at a better understanding of what drives it is critical for those who want to influence it. As Layzell and Lyddon (1990) explained in reference to state budgeting for higher education: “You have got to know the system to beat the system” (p. xix).

Acknowledgements The authors wish to thank William M. Zumeta, Shouping Hu, and Michael B. Paulsen for their helpful suggestions and edits which greatly improved this chapter. The authors would also like to thank Andy Carlson from SHEEO, Brian Sigritz from NASBO, Allison Bell from NCES and formerly with SHEEO, Colleen Lenihan from NCES, and Jane Wellman formerly with the Delta Cost Project who all provided excellent suggestions and corrections to the first two sections of this chapter. Finally, we would like to thank Luciana Dar for her willingness to share her exceptional work with us. Of course, all errors are the responsibility of the authors alone.

Appendix A: Studies of State Appropriation to Higher Education^a

Authors	Year	Citation	Dependent variable(s) (RE: state support) ^b	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/-)
1. Archibald, R. B., & Feldman, D. H.	2006	Archibald, R. B., & Feldman, D. H. (2006). State higher education spending and the tax revolt. <i>Journal of Higher Education</i> , 77(4), 618–643	State appropriations to higher ed. per \$1,000 of personal income (excluding federal and lottery funds)	Grapevine, Census, Book of the States	1961–2001 Panel data, fixed Zeffects	47 States	Democratic Governor, + Democratic Strength, + Super Majority Requirements, + Corrections Spending, + Health Spending, + Tax and Expenditure Limits, –
2. Bailey, M. E., Rom, M. C., & Taylor, M.	2004	Bailey, M. E., Rom, M. C., & Taylor, M. (2004). State competition in higher education: A race to the top or a race to the bottom? <i>Economics of Governance</i> , 5(1), 53–75	Change in state support for higher education, annually (higher ed. exp. per state resident; higher ed. exp. FTE, CPI adjusted)	IPEDS, ICPSR, state finances	1986–1987 Panel data, two-way fixed effects	48 States	Democratic Strength, – Competition (spending between states and neighbors), – Convergence (policy measure between states and neighbors), – Personal Income per Capita, – Student Aged Pop. (18–24), + Elderly Pop. (65<), +

3.	Cheslock, J., J., & Gianneschi, M.	2008	Cheslock, J., & Gianneschi, M. (2008). Replacing state appropriations with alternative revenue sources: The case of voluntary support. <i>Journal of Higher Education</i> , 79, 208+	State appropriations per student (adjusted CPI, HEPI, FTE)	IPEDS ICPSR, state finances	1994–2004 Panel data	All public four-year institutions that offer undergraduate degrees, have a 2000 Carnegie Classification of Research/Doctoral, Masters, or Baccalaureate, 47 states	Barron's Selectivity Ranking, + Enrollment, – Research/Doctoral Carnegie Classification, + US News Ranking, – Personal Income per Capita, + State Appropriations Previous Year, + Unemployment Rate, –
4.	Coughlin, C. C., & Erikson, O. H.	1986	Coughlin, C. C., & Erikson, O. H. (1986). Determinants of state aid and voluntary support of higher education. <i>Economics of Education Review</i> , 5(2), 179–190	State appropriations per student	Halstead, <i>How States Compare in Financial Support of Public Higher Education</i> , 1983–1984	1980–1981 Cross-sectional OLS	52 Major research universities	Top Undergraduate Quality, + SAT, + Top Faculty, + Tuition, – Relative Tuition, + Per Capita State Income, + Tax Effort, + NCAA Appearance, + TV Appearances, + Basketball Winning %, +

(continued)

Appendix A (continued)

Authors	Year	Citation	Dependent variable(s) (RE: state support) ^b	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/-)
5. Dar, L., & Franke, R.	2010	Dar, L., & Franke, R. (2010). <i>Revisiting the political economy of government support for higher education: Evidence from a new unifying measure for the American states</i> . Presented at the Annual Consortium for Higher Education Researchers, Oslo, Norway	Trostel and Ronca's (2009) "unifying measure of state support of higher education"	Trostel and Ronca (2009)	1980–2005 Panel data, fixed effects	49 States	Carnegie Classification I or II, + Private Enrollment FTE, – Tuition per FTE, – Democratic Strength, + Polarization, + State Policy Priority Score, – Personal Income per Capita, – Student Aged Pop. (18–24), + State Revenue, + Unemployment Rate, +

6.	Dar, L., & Spence, M. J.	2011	Dar, L., & Spence, M. J. (2011). Partisanship, political polarization, and state budget outcomes: The case of higher education. <i>SSRN eLibrary</i> , Retrieved from http://ssrn.com/abstract=1577365	Appropriations per \$1,000 in personal income, relative appropriations by share of budget	STATE GOVERNMENT FINANCES 1900–2004 – File provided by the Census Bureau Staff Grapevine/Center for the Study of Education Policy – Illinois State University http://coe.ilstu.edu/grapevine/ Welcome.htm	1976–2004 Panel Data, fixed effects	49 States	Private Enrollment FTE, – Tuition per FTE, – Democratic Strength, + Polarization, + State Policy Priority Score, – Personal Income per Capita, – Student Aged Pop. (18–24), + Pop. Share of School Aged (18–24), + State Revenue, + Unemployment Rate, –
7.	Delaney, J. A., & Doyle, W. R.	2007, 2011	Delaney, J. A., & Doyle, W. R. (2011). State spending on higher education: Testing the balance wheel over time. <i>Journal of Education Finance</i> , 36(4), 343–368	State appropriations for higher education (CPI adjusted) (1) Absolute levels of state funding for higher ed. (2) Year-to-year funding for Higher ed. by state and by year data evaluated by decade and business cycle	Grapevine, http://www.grapevine.ilstu.edu/historical/index.htm	1985–2004 Panel Data	49 States	Enrollment, + Private Enrollment FTE, – Share of Public, 2 year Enrollment, – Share of Private, 2 year Enrollment, – Share of Public, 4 year Enrollment, – Gross State Product, + Total Expenditure all Budget Categories other than HE, +

(continued)

Appendix A (continued)

Authors	Year	Citation	Dependent variable(s) (RE: state support) ^b	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/-)
8. Doyle, W. R.	2007	Doyle, W. R. (2007). The political economy of redistribution through higher education subsidies. In J. C. Smart (Ed.), <i>Higher education: Handbook of theory and research</i> (Vol. XXII, pp. 335–409). Dordrecht, The Netherlands: Springer	State tax appropriations for higher education (CPI adjusted)	Center for the Study of Education Policy, US Census Bureau, Grapevine	1985–1989 1951–2007 (no data for 1973) Panel data, two-stage least squares estimation	50 States 48 States	Private Enrollment FTE, + Student Aged Pop. (18–24), +
9. Hossler, D., Lund, J. P., Ramin, J., Westfall, S., & Irish, S.	1997	Hossler, D., Lund, J. P., Ramin, J., Westfall, S., & Irish, S. (1997). State funding for higher education: The Sisyphean Task. <i>The Journal of Higher Education</i> , 68(2), 160–190	Levels of state appropriations to public four-year institutions	Grapevine	1990, 1991, 1992, Separately CROSS-TABs, regression analyses, and exploratory factor analyses	50 States	Enrollment, + State Appropriations Previous Year, +

10.	Humphreys, B. R.	2000	Humphreys, B. R. (2000). Do business cycles affect state appropriations to higher education? <i>Southern Economic Journal</i> , 67(2), 398–413	Real state appropriations for higher ed. per FTE (HEPI adjusted)	Department of Commerce, Grapevine, IPEDS	1969–1994 Panel data, fixed effects	50 States	Growth in Income, + Personal Growth in Income Income Expansionary Years, + Personal Growth in Income Income Recessionary Years, + Personal Income Expansionary Years, + Personal Income Recessionary Years, + Democratic Strength, + Avg. Income Tax on Wages, + Medicare Appropriations, – State Revenue, + Top Marginal Income Tax Rate, + Unemployment Rate, –
11.	Kane, T. J., Orszag, P. R., & Gunter, D. L.	2003	Kane, T. J., Orszag, P. R., & Gunter, D. L. (2003). <i>State fiscal constraints and higher education spending: The role of Medicaid and the business cycle</i> . Washington, DC: Brookings Institution	(1) Real higher education appropriations per capita (\$1,000) (2) Real higher education appropriations as % of GSP	Dept. of Commerce, Grapevine, <i>Digest of Higher Education Statistics</i>	1981–2001 Panel data, two-way fixed effects (state, time) regression	48 States	

(continued)

Appendix A (continued)

Authors	Year	Citation	Dependent variable(s) (RE: state support) ^b	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/–)
12. Knott, J., & Payne, A.	2004	Knott, J., & Payne, A. (2004). The impact of state governance structures on management and performance of public organizations: A study of higher education institutions.	State appropriations institution (adjusted for 1996 price indices)	CASPAR, Institute for Scientific Information	1997–1998 Panel data	48 States, comprehensive and Ph.D.-granting public universities	Medical School, + Faculty Size, + Undergrad Enrollment, + HE Governance Structure, –
13. Koshal, R. K., & Koshal, M.	2000	Koshal, R. K., & Koshal, M. (2000). State appropriation and higher education tuition: What is the relationship?	Appropriation per FTE in a state	<i>The Statistical Abstract of the United States</i>	1990 Panel data, two-stage least squares	47 States (Nebraska excluded)	Share of Public, 2 year Enrollment, + Tuition per FTE, – Democratic Strength, + FTE Ratio to High School Grad 4 year, – Personal Income per Capita, – State Revenue, +

14.	Leslie, L. L., & Ramey, G.	1986	Leslie, L. L., & Ramey, G. (1986). State appropriations and enrollments: Does enrollment growth still pay? <i>The Journal of Higher Education</i> , 57(1), 1–19	Real (inflation- adjusted) appropriations in year	Chambers's State Tax Funds for Operating Expenses of Higher Education	1965–1981 Panel Data, OLS Regression	439 Public colleges and universities; 25 research I universities, 31 research II universities, 35 doctoral- granting I, 18 doctoral-grant- ing II, 235 comprehensive I, and 95 comprehensive II institutions (using Carnegie classifications)	Enrollment, – Research/Doctoral Carnegie Classification, –
15.	Lindeen, J. W., & Willis, G. L.	1975	Lindeen, J. W., & Willis, G. L. (1975). Political, socioeconomic and demographic patterns of support for public higher education. <i>The Western Political Quarterly</i> , 28(3), 528–541	(1) Public Financial Support: Total Amount per Taxpayer; Taxpayer Effort (2) Increase in state Support. 1960–70: gross net Percentage; Net Percentage Increase	<i>Statistical Abstract of the United States</i> (1962), <i>Statistical Abstract of the United States</i> , (1972), <i>Digest of Educational Statistics</i> (1971), <i>Ohio Basic Data Series: Higher Education</i> (1971)	1960–1970 Correlation analysis, OLS	48 States	Gross % Increase State Support, + Taxpayer Effort, –

(continued)

Appendix A (continued)

Authors	Year	Citation	Dependent variable(s) (RE: state support) ^b	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/-)
16. Lowry, R. C.	2001	Lowry, R. C. (2001). The effects of state political interests and campus outputs on public university revenues. <i>Economics of Education Review</i> , 20(2), 105–119	Dollar amount of state government appropriations, grants and contracts per 100,000 voting-age residents in the state	IPEDS	1994–1995 Panel data, two-stage least squares regression (separate analyses)	All public, four-year institutions in the 50 states for which complete financial and enrollment data was available at the time (428 universities in most cases)	Graduate & Professional Enrollment, + Mean Faculty Compensation, + Medical School, + Private Enrollment FTE, – Tuition per FTE, + Undergrad, Non-resident Enrollment, + Undergrad, Resident Enrollment, + HE Governance Structure, – Local Government Funds, – Elderly Pop. (65<), – Public Service Spending, + Research Spending, +

17.	McLendon, M. K., Hearn, J. C., & Mokher, C. G.	2009	McLendon, M. K., Hearn, J. C., & Mokher, C. G. (2009). Partisans, professionals, and power: The role of political factors in state higher education funding. <i>The Journal of Higher Education</i> , 80(6), 686–713	State appropriations per \$1,000 of personal income (CPI adjusted 2004)	Grapevine, Postsecondary Opportunity	1984–2004 Panel Data, regression model, fixed effects	49 States (e.g., Nebraska)	Private Enrollment FTE, – Share of Public, 2 year Enrollment, + Gubernatorial Power, – HE Interest Groups, + Legislative Professionalism, + Republican Governor, – Republican Strength, – Term Limits, + Student Aged Pop. (18–24), – Elderly Pop. (65<), – Unemployment Rate, – Graduate & Professional Enrollment, + Proportion Completion in STEM, + Democratic Strength, + Gubernatorial Budget Powers, – Inst. Located in State Capital, + of Appropriations Comm. Members Graduating from Inst, + Term Limits, – Student Aged Pop. (18–24), –
18.	McLendon, M. K., Mokher, C. G., & Doyle, W.	2009	McLendon, M. K., Mokher, C. G., & Doyle, W. (2009). “Privileging” public research universities: An empirical analysis of the distribution of state appropriations across research and non-research universities. <i>Journal of Education Finance</i> , 34(4), 372–401	State appropriations per FTE for each institution	IPEDS	2003–2004 Random effects model conditioned on the mean of individual-level variables	501 Institutions in 46 states, excluding institutions with missing data	

(continued)

Appendix A (continued)

Authors	Year	Citation	Dependent variable(s) (RE: state support) ^b	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/–)
19. Morgan, D., Kickham, K., & LaPlant, J.	2001	Morgan, D., Kickham, K., & LaPlant, J.	State and general education expenditures for	<i>Digest of Education Statistics</i> , Census	1986–1995 Panel data	49 States (e.g., Arizona)	Enrollment, + Federal Aid, – Faculty Size, +
20. Nicholson-Crotty, J., & Meier, K. J.	2003	Nicholson-Crotty, J., & Meier, K. J. (2003). Politics, structure, and public policy: The case of higher education. <i>Educational Policy</i> , 17(1), 80–97	State/local appropriations per Student	<i>Digest of Education</i>	1989–1996 Panel data, fixed effects	47 States (e.g., Nebraska, Michigan, Delaware)	Citizen Ideology (Berry Data), – HE Governance Structure, – Government Ideology, + Legislative Professionalism, –
21. Okunade, A. A.	2004	Okunade, A. A. (2004). What factors influence state appropriations for public higher education in the united states? <i>Journal of Education Finance</i> , 30(2), 123–138	Public higher education appropriation share of the total state budget	US Census	1993–1994, 1994–1995 OLS, GLS, pooled regression, Panel Data	50 States	Per Capita Enrollment, + Tuition per FTE, – Annual Expenditure per Inmate, + Debt to Expenditure Ratio, + Medicare Appropriations, –

22.	Peterson, R. G.	1976	Peterson, R. G. (1976). Environmental and political determinants of state higher education appropriations policies. <i>The Journal of Higher Education</i> , 47(5), 523–542	Appropriations for both per capita and per student, for: (1) All public institutions (2) Public 4 year (3) Public 2 year	US Office of Education, US Bureau of the Census	1960, 1969 Panel data, 2 cross-sectional studies	50 States	Enrollment, + Share of Public, 2 year Enrollment, + Share of Private, 2 year Enrollment, – Share of Public, 4 year Enrollment, + Adults w/College Degree, + Hofferbert's Influence Factor Scores, + Hofferbert's Industrialization Factor Scores, – Median Yrs. School completed by Pop, + Graduate & Professional Enrollment, + Graduation Rate, + % Black, + % Hispanic, – Performance Funding, + Research/Doctoral Carnegie Classification, + Selectivity, + Undergrad Enrollment, +
23.	Rabovsky, T.	2012	Rabovsky, T. M. (2012). Accountability in higher education: Exploring impacts on state budgets and institutional spending patterns. <i>Journal of Public Administration Research and Theory</i>	State appropriations, measured in constant dollars	SHEEO	1999–2008 for stage one; 1998–2008 for stage two Panel data	50 States	

(continued)

Appendix A (continued)

Authors	Year	Citation	Dependent variable(s) (RE: state support) ^b	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/–)
24. Rizzo, M. J.	2004	Rizzo, M. J. (2004). State preferences for higher education spending: A panel data analysis, 1977–2001. <i>Federal Reserve Bank of Cleveland's Conference on Education and Economic Development</i>	(1) Share of the public general fund budget allocated to education (2) Share of the education budget allocated to higher education (3) Share of the higher education budget allocated to institutions	US Bureau of the Census, State Government Finance Files(1972–2001), IPEDS, HEGIS, NASSGAP, Grapevine	1977–2001 Panel data	50 States	Giving, – PhD/BA Degrees Awarded, – Regional Non-Resident Tuition, – Share of Public, 2 year Enrollment, + State-Based Merit Scholarship, – Assembly Seats Per Capita, – Voter Turn Out, – Court Reform State, – Crime Rate, – Gross In-Migration, – Gross Out-Migration, – Median Household Income, – Median Household Income Squared, + Student Aged Pop. (18–24), + Race Interact, + Revenue Corporate Income Tax, + Revenue from Fuels, – Revenue Income Tax, +

25.	Strathman, J. G.	1994	Strathman, J. G. (1994). Migration, benefit spillovers and state support of higher education. <i>Urban Studies</i> , 31(6), 913–920	State and local appropriations per FTE student	<i>Digest of Education Statistics, Statistical Abstract of the US Census</i>	1989–1990 Three-stage least squares parameter estimates	48 States	Revenue Lottery, – School Race Ratio, – Share of GSP (Ag, Fishing, Mining), + Share of GSP (Construction, Manufacturing, Trans. And Utilities), + Share of GSP (Government), + Share of GSP (Trade), + Unemployment Rate, – Unemployment Rate Non-White, – Gross Out-Migration, – Personal Income per Capita, +
-----	------------------	------	---	--	--	--	-----------	--

Appendix A (continued)

Authors	Year	Citation	Dependent variable(s) (RE: state support) ^b	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/-)
26. Tandberg, D. A.	2008	Tandberg, D. A. (2008). The politics of state higher education funding. <i>Higher Education Review</i> , 5, 1	Higher education as appropriation as a % of state general fund expenditures	Grapevine, Census	1971–2001 Panel data, fixed effects	50 States	Giving, – In State Tuition (lagged), – Private Enrollment FTE, + Regional Non-Resident Tuition, + Democratic Governor, + Democratic Strength, + Electoral Competition, + HE Interest Ratio, + Legislative Unity, – Appropriations to K-12, – Gross State Product, + Health (Medical CPI) Share of pop. > 65 year, – Inequality, + Medicaid, – Medicaid CPI, – Student Aged Pop. (18–24), – Elderly Pop. (65<), – Population Below PELL, – Race Interact, + Unemployment Rate, –

27.	Tandberg, D.	2010	Tandberg, D. (2010). Interest groups and governmental institutions: The politics of state funding of public higher education. <i>Educational Policy</i> , 24(5), 44	State appropriations per US\$1,000 personal income	Grapevine, Postsecondary Opportunity	1976–2004 Panel data, fixed effects	50 States	Private Enrollment FTE, + Share of Public, 2 year Enrollment, – State uses Formula Funding, + Tuition Avg 4 year, – Democratic Governor, + Democratic Strength, + HE Governance Structure, – Government Ideology, + HE Interest Ratio, + Legislative Professionalism, + Legislative Unity, – Gini Coefficient, – Gross State Product, + Medicaid, – Student Aged Pop. (18–24), – Population Below PELL, + Unemployment Rate, +
-----	--------------	------	--	--	--	--	-----------	---

(continued)

Appendix A (continued)

Authors	Year	Citation	Dependent variable(s) (RE: state support) ^b	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/–)
28. Tandberg, D. A.	2010	Tandberg, D. A. (2010). Politics, interest groups and state funding of public higher education. <i>Research in Higher Education</i> , 51(5), 416–450	State expenditure on higher education as a % of total state expenditures	NASBO	1986–2004 Panel data, fixed effects	50 States	Private Enrollment FTE, + Tuition Avg 4 year, – Citizen Ideology (Berry Data), + Democratic Governor, – Interest Group Density, – Legislative Professionalism, + Legislative Unity, – Political Culture, + Gross State Product, –
29. Tandberg, D. A. & Ness, Eric	2011	Tandberg, D. A. & Ness, E. (2011). State capital expenditures for higher education: “Where the real politics happens.” <i>Journal of Education Finance</i> , 36(4), 394–423	Natural log of state capital expenditures	NASBO	1988–2004 Panel data	50 States	Giving, + State uses Formula Funding, + Tuition Avg 4 year, – Electoral Competition, + HE Governance Structure, – Gubernatorial Budget Powers, – HE Interest Ratio, + Legislative Professionalism, + Political Culture, + Voter Turn Out, – Student Aged Pop. (18–24), –

30.	Toutkoushian, R. K., & Hollis, P.	1998	Toutkoushian, R. K., & Hollis, P. (1998). Using panel data to examine legislative demand for higher education. <i>Education Economics</i> , 6(2), 141–157	Natural log of Level of appropriations for higher education in each state	Halstead data (State Profiles; Financing Public Higher Education)	1982–1996 Panel data, OLS, 2SLS, fixed effects	50 States	Mean Faculty Compensation, + Median Household Income, + Unemployment Rate, –
31.	Weerts, D. J., & Ronca, J. M.	2008	Weerts, D. J., & Ronca, J. M. (2008). <i>Determinants of state appropriations for higher education from 1985–2005: An organizational theory analysis</i> . Madison, WI: Wisconsin Center for the Advanced of Postsecondary Education	First difference of the natural log of total restricted plus unrestricted state appropriations converted to 2004 dollars	US Bureau of Labor Statistics, IPEDS	1985–2004 Panel data, random effects	50 States, 1,000 institutions	Carnegie Classification, – # of Pub Inst. in State, + Republican Governor, + Voter Turn Out, + Appropriations to K-12, – Court Reform State, – Health Spending, – Personal Income per Capita, – Student Aged Pop. (18–24), – Unemployment Rate, –

*Findings in regard to significance and direction reflect the results for each variable from what appeared to be the final or most inclusive model in each of the associated studies

^bOnly the dependent variable(s) measuring state support of higher education are included here. Many studies also include measures of other phenomena as additional dependent variables; however, they are not included here

References

- Alt, J. E., & Lowry, R. C. (1994). Divided government, fiscal institutions, and budget deficits: Evidence from the states. *The American Political Science Review*, 88(4), 811–828.
- Archibald, R. B., & Feldman, D. H. (2006). State higher education spending and the tax revolt. *Journal of Higher Education*, 77(4), 618–643.
- Bailey, M. E., Rom, M. C., & Taylor, M. (2004). State competition in higher education: A race to the top or a race to the bottom? *Economics of Governance*, 5(1), 53–75.
- Barrilleaux, C., & Berkman, M. (2003). Do Governors matter? Budgeting rules and the politics of state policy making. *Political Research Quarterly*, 56(4), 409–417.
- Baumgartner, F. R., & Jones, B. D. (1993). *Agendas and instability in American politics*. Chicago: University of Chicago Press.
- Black, D. (1948). On the rationale of group decision making. *Journal of Political Economy*, 56(1), 23–34.
- Blackwell, E. A., & Cistone, P. J. (1999). Power and influence in higher education: The case of Florida. *Higher Education Policy*, 12, 111–122.
- Borcherding, T., & Deacon, R. (1972). The demand for the services of non-federal governments. *American Economic Review*, 62, 891–901.
- Carey, J. M., Niemi, R. G., & Powell, L. W. (2000). Incumbency and the probability of reelection in state legislative elections. *Journal of Politics*, 62, 671–700.
- Cheslock, J., & Gianneschi, M. (2008). Replacing state appropriations with alternative revenue sources: The case of voluntary support. *Journal of Higher Education*, 79, 208+.
- Clofelter, C. T. (1976). Public spending for higher education: An empirical test of two hypotheses. *Public Finance*, 31(2), 177–195.
- Coriati, B., & Dosi, G. (1998). Learning how to govern and learning how to solve problems: On the coevolution of competences, conflict and organizational routines. In A. Chandler, P. Hagstrom, & O. Solwell (Eds.), *The dynamic firm* (pp. 103–133). Oxford, UK: Oxford University Press.
- Cornwell, C., Mustard, D. B., & Sridhar, D. J. (2006). The enrollment effects of merit-based financial aid. *Journal of Labor Economics*, 24, 761–786.
- Coughlin, C. C., & Erikson, O. H. (1986). Determinants of state aid and voluntary support of higher education. *Economics of Education Review*, 5(2), 179–190.
- Dar, L., & Franke, R. (2010). *Revisiting the political economy of government support for higher education: Evidence from a new unifying measure for the American states*. Presented at the Annual Consortium for Higher Education Researchers, Oslo, Norway.
- Dar, L., & Spence, M. J. (2011). Partisanship, political polarization, and state budget outcomes: The case of higher education. *SSRN eLibrary*, Retrieved from <http://ssrn.com/abstract=1577365>
- Dar, L. (2012). The political dynamics of higher education policy. *The Journal of Higher Education*, 83(6), 769–794.
- deGive, M. L., & Olswang, S. (1999). Coalition building to create a branch campus system. *The Review of Higher Education*, 22(3), 287–313.
- Delaney, J. A., & Doyle, W. R. (2007). The role of higher education in state budgets. In D. E. Heller & K. M. Shaw (Eds.), *State postsecondary education research*. Sterling, VA: Stylus Publishing.
- Delaney, J. A., & Doyle, W. R. (2011). State spending on higher education: Testing the balance wheel over time. *Journal of Education Finance*, 36(4), 343–368.
- Dowding, K., & King, D. (1995). *Preferences, institutions and rational choice*. Oxford, UK: Clarendon.
- Downs, A. (1957). *An economic theory of democracy*. New York: Harper.
- Doyle, W. R. (2007). The political economy of redistribution through higher education subsidies. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. XXII, pp. 335–409). Dordrecht, The Netherlands: Springer.
- Doyle, W. R., McLendon, M. K., & Hearn, J. C. (2010). Why states adopted prepaid tuition and college savings programs: An event history analysis. *Research in Higher Education*, 51(7), 659–686.

- Eisenhardt, K. (1989). Agency theory: An assessment and a review. *Academy of Management Review*, 14, 57–74.
- Fernandez, R., & Rogerson, R. (1995). On the political economy of education subsidies. *Review of Economic Studies*, 62(2), 249–262.
- Ferrin, S. E. (2003). Characteristics of in-house lobbyist in American colleges and universities. *Higher Education Policy*, 16(1), 87–108.
- Ferrin, S. E. (2005). Tasks and strategies of in-house lobbyists in American colleges and universities. *International Journal of Educational Advancement*, 5(2), 180–191.
- Fiorina, M. (1994). Divided government in the American States: A byproduct of legislative professionalism? *American Political Science Review*, 88, 304–316.
- Frost, S. H., Hearn, J. C., & Marine, G. M. (1997). State policy and the public research university: A case study of manifest and latent tensions. *Journal of Higher Education*, 68(4), 363–397.
- Garand, J. C., & Hendrick, R. M. (1991). Expenditure tradeoffs in the American States: A longitudinal test, 1948–1984. *Western Political Quarterly*, 44(4), 915–940.
- Geddes, B. (1994). *Politician's dilemma: Building state capacity in Latin America*. Berkeley, CA: University of California Press.
- Geddes, B. (1996). Initiation of new democratic institutions in Eastern Europe and Latin America. In A. Lijphart & C. H. Waisman (Eds.), *Institutional design in new democracies: Eastern Europe and Latin America*. Boulder, CO: Westview Press.
- Goldin, C., & Katz, L. F. (1998). The origins of state-level differences in the public provision of higher education: 1890–1940. *American Economic Review*, 88(2), 303–308.
- Grafstein, R. (1992). *Institutional realism: Social and political constraints on rational actors*. New Haven, CT: Yale University Press.
- Grapevine System. (2011). *An annual compilation of data on state tax appropriations for the general operation of higher education*. Normal, IL: Center for the Study of Education Policy Illinois State University. <http://www.coe.ilstu.edu/grapevine/>
- Gray, V., & Lowery, D. (1996). *The population ecology of interest representation: Lobbying communities in the American States*. Ann Arbor, MI: University of Michigan Press.
- Gray, V., & Lowery, D. (2001). The expression of density dependence in state communities of organized interests. *American Politics Research*, 29(4), 374–391.
- Hearn, J. C., & Griswold, C. P. (1994). State-level centralization and policy innovation in U.S. postsecondary education. *Educational Evaluation and Policy Analysis*, 16(2), 161–190.
- Heller, D. E. (1999). The effects of tuition and state financial aid on public college enrollment. *The Review of Higher Education*, 23(1), 65–89.
- Hero, R. E., & Tolbert, C. J. (1996). A racial/ethnic diversity interpretation of politics and policy in the states of the U.S. *American Journal of Political Science*, 40(3), 851–871.
- Hoenack, S., & Pierro, D. (1990, January). An econometric model of a public university's income and enrollments. *The Journal of Economic Behaviour and Organization*, 14, 403–423.
- Holcombe, R. G. (1989). *Economic models and methodology*. New York: Greenwood.
- Hossler, D., Lund, J. P., Ramin, J., Westfall, S., & Irish, S. (1997). State funding for higher education: The Sisyphean Task. *Journal of Higher Education*, 68(2), 160–190.
- Humphreys, B. R. (2000). Do business cycles affect state appropriations to higher education? *Southern Economic Journal*, 67(2), 398–413.
- Jacoby, W. G., & Schneider, S. K. (2001). Variability in state policy priorities: An empirical analysis. *The Journal of Politics*, 63(2), 544–568.
- Kane, T. J., & Orszag, P. R. (2003). *Funding restrictions at public universities: Effects and policy implications* (Brookings Institution Working Paper).
- Kane, T. J., Orszag, P. R., Apostolov, E., Inman, R. P., & Reschovsky, A. (2005). Higher education appropriations and public universities: Role of Medicaid and the business cycle [with comments]. *Brookings-Wharton Papers on Urban Affairs*, 6, 99–146.
- Kane, T. J., Orszag, P. R., & Gunter, D. L. (2003). *State fiscal constraints and higher education spending: The role of Medicaid and the business cycle* (Discussion Paper No. 11). Washington, DC: The Urban Institute.

- Kiel, L. D., & Elliott, E. (1992). Budgets as dynamic systems: Change, variation, time, and budgetary heuristics. *Journal of Public Administration Research and Theory*, 2(2), 139–156.
- Kingdon, J. W. (1984). *Agendas, alternatives, and public policies*. New York: HarperCollins.
- Kingdon, J. W. (1995). *Alternatives, and public policies* (2nd ed.). Boston: Little, Brown.
- Kiser, L., & Ostrom, E. (1982). The three worlds of action. In E. Ostrom (Ed.), *Strategies of political inquiry* (pp. 179–221). Beverly Hills, CA: Sage.
- Kivisto, J. (2005). The government-higher education institution relationship: Theoretical considerations from the perspective of agency theory. *Tertiary Education and Management*, 11(1), 1–17.
- Kivisto, J. A. (2007). *Agency theory as a framework for the government-university relationship*. Tampere, Finland: Higher Education Group/Tampere University Press.
- Knott, J., & Payne, A. (2004). The impact of state governance structures on management and performance of public organizations: A study of higher education institutions. *Journal of Policy Analysis and Management*, 23(1), 13–30.
- Koshal, R. K., & Koshal, M. (2000). State appropriation and higher education tuition: What is the relationship? *Education Economics*, 8(1), 81–89.
- Lane, J. E. (2003). *State government oversight of public higher education: Police patrols and fire alarms*. Paper presented at the annual meeting of the Association for the Study of Higher Education, Portland, OR.
- Lane, J. E. (2005). *State oversight of higher education: A theoretical review of agency problems with complex principals*. Paper presented at 2005 Annual Conference of the Association for the Study of Higher Education, Philadelphia.
- Lane, J. E. (2007). The spider web of oversight: An analysis of external oversight of higher education. *Journal of Higher Education*, 78(6), 615–644.
- Lane, J. E., & Kivisto, J. A. (2008). Interests, information, and incentives in higher education: Principal-agent theory and its potential application to the study of higher education governance. In J. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. XVIII, pp. 141–179). New York: Agathon Press.
- Layzell, D. T., & Lyddon, J. W. (1990). *Budgeting for higher education at the state level: Enigma, paradox, and ritual* (ASHE-ERIC Higher Education Report 4, 1990, ERIC). Washington, DC: School of Education and Human Development, George Washington University.
- Leslie, L. L., & Ramey, G. (1986). State appropriations and enrollments: Does enrollment growth still pay? *Journal of Higher Education*, 57(1), 1–19.
- Lindeen, J. W., & Willis, G. L. (1975). Political, socioeconomic and demographic patterns of support for public higher education. *The Western Political Quarterly*, 28(3), 528–541.
- Longanecker, D. (2006). A tale of two pities. *Change*, 38(1), 14.
- Lowry, R. C. (2001). The effects of state political interests and campus outputs on public university revenues. *Economics of Education Review*, 20(2), 105–119.
- March, J. G., & Olsen, J. P. (1984). The new institutionalism, organizational factors in political life. *American Political Science Review*, 78(3), 734–749.
- McGuinness, A. C. (2003). *Models of postsecondary education and governance in the States*. Denver, CO: Education Commission of the States.
- McLendon, M. K. (2003). The politics of higher education: Toward an expanded research agenda. *Educational Policy*, 17(1), 165–191.
- McLendon, M. K., Deaton, R., & Hearn, J. C. (2007). The enactment of reforms in state governance of higher education: Testing the political instability hypothesis. *Journal of Higher Education*, 78(6), 645–675.
- McLendon, M. K., Hearn, J. C., & Deaton, R. (2006). Called to account: Analyzing the origins and spread of state performance-accountability policies for higher education. *Educational Evaluation and Policy Analysis*, 28(1), 1–24.
- McLendon, M. K., Hearn, J. C., & Mokher, C. G. (2009). Partisans, professionals, and power: The role of political factors in state higher education funding. *Journal of Higher Education*, 80(6), 686–713.

- McLendon, M. K., Heller, D. E., & Young, S. P. (2005). State postsecondary policy innovation: Politics, competition, and the interstate migration of policy ideas. *Journal of Higher Education*, 76(4), 363–400.
- McLendon, M. K., Mokher, C. G., & Doyle, W. (2009). “Privileging” public research universities: An empirical analysis of the distribution of state appropriations across research and non-research universities. *Journal of Education Finance*, 34(4), 372–401.
- McLendon, M. K., Mokher, C. G., & Flores, S. M. (2011). Legislative agenda setting for in-state resident tuition policies: Immigration, representation, and educational access. *American Journal of Education*, 117(4), 563–602.
- Moe, T. M. (1984). The new economics of organization. *American Journal of Political Science*, 28(4), 739–777.
- Moe, T. M. (1987). An assessment of the positive theory of “congressional dominance”. *Legislative Studies Quarterly*, 12, 475–520.
- Morgan, D., Kickham, K., & LaPlant, J. (2001). State support for higher education: A political economy approach. *The Policy Studies Journal*, 29(3), 359–371.
- Mortenson, T. G. (2005). *State tax fund appropriations for higher education FY1961 to FY2005*. Oskaloosa, IA: Postsecondary Education Opportunity. www.postsecondary.org
- Ness, E. (2010). The politics of determining merit aid eligibility criteria: An analysis of the policy process. *Journal of Higher Education*, 81(1), 33–60.
- Ness, E., Tandberg, D. A., & McLendon, M. (2008, April). *Interest groups and state policy for higher education: Toward new conceptual understandings and future research directions*. Presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.
- Nicholson-Crotty, J., & Meier, K. J. (2003). Politics, structure, and public policy: The case of higher education. *Educational Policy*, 17(1), 80–97.
- North, D. (1990). *Institutions, institutional change, and economic performance*. New York: Cambridge University Press.
- Nownes, A. J. (2006). *Total lobbying: What lobbyists want (and how they try to get it)*. Cambridge, UK: Cambridge University Press.
- Nownes, A. J., Thomas, C., & Hrebienar, R. (2008). Interest groups in the states. In V. Gray & R. Hanson (Eds.), *Politics in the American States* (9th ed., pp. 98–126). Washington, DC: Congressional Quarterly Press.
- Okunade, A. A. (2004). What factors influence state appropriations for public higher education in the United States? *Journal of Education Finance*, 30(2), 123–138.
- Ostrom, E. (1992). *Crafting institutions for self-governing irrigation systems*. San Francisco: ICS. 111 pp.
- Ostrom, E. (1999). Institutional rational choice: An assessment of the institutional analysis and development framework. In P. A. Sabatier (Ed.), *Theories of the policy process* (pp. 35–71). Boulder, CO: Westview.
- Ostrom, E., Gardner, R., & Walker, J. (1994). *Rules, games, and common pool resources*. Ann Arbor, MI: University of Michigan Press.
- Ostrom, V. (1991). *The meaning of American federalism: Constituting a self-governing society*. San Francisco: ICS Press.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research*. San Francisco: Jossey-Bass.
- Payne, A. A. (2003). The effects of congressional appropriation committee membership on the distribution of federal research funding to universities. *Economic Inquiry*, 41(2), 325–345.
- Payne, A. A., & Roberts, J. (2004). *Government oversight of organizations engaged in multiple activities: Does centralized governance encourage quantity or quality?* Unpublished manuscript, McMaster University.
- Peterson, R. G. (1976). Environmental and political determinants of state higher education appropriations policies. *Journal of Higher Education*, 47(5), 523–542.

- Rabovsky, T. M. (2012). Accountability in Higher Education: Exploring Impacts on State Budgets and Institutional Spending Patterns. *Journal of Public Administration Research and Theory*.
- Richardson, R., Shulock, N., & Teranishi, R. (2005). *Public policy and higher education performance in the state of California*. New York: Alliance for International Higher Education Policy Studies.
- Rizzo, M. J. (2004). State preferences for higher education spending: A panel data analysis, 1977–2001. In *Federal Reserve Bank of Cleveland's conference on education and economic development*.
- Ross, S. A. (1973). The economic theory of agency: The principal's problem. *American Economic Review*, 63(2), 134–139.
- Sabatier, P. A. (1991). Toward better theories of the policy process. *PS: Political Science and Politics*, 24(2), 147–156.
- Sabatier, P. A. (Ed.). (1999). *Theories of the policy process*. Boulder, CO: Westview.
- Sabloff, P. L. (1997). Another reason why state legislatures will continue to restrict public university autonomy. *The Review of Higher Education*, 20(2), 141–162.
- Shakespeare, C. (2008). Uncovering information's role in the state higher education policy-making process. *Educational Policy*, 22(6), 875–899.
- Sharkansky, I. (1968). Agency requests, gubernatorial support, and budget success in state legislatures. *American Political Science review*, 62, 1220–1231.
- Shepsle, K. A. (1979). Institutional arrangements and equilibrium in multidimensional voting models. *American Journal of Political Science*, 23(1), 27–59.
- Shepsle, K. A. (1989). Studying institutions: Some lessons from the rational choice approach. *Journal of Theoretical Politics*, 1(2), 131–147.
- Squire, P. (2000). Uncontested seats in state legislative elections. *Legislative Studies Quarterly*, 25(1), 131–146.
- Squire, P., & Hamm, K. (2005). *101 chambers: Congress, state legislatures, and the future of legislative studies*. Columbus, OH: Ohio State University Press.
- State Higher Education Executive Officers (SHEEO). (2011). *State higher education finance*. Boulder, CO: Author.
- Strathman, J. G. (1994). Migration, benefit spillovers and state support of higher education. *Urban Studies*, 31(6), 913–920.
- Tandberg, D. A. (2006). State-level higher education interest group alliances. *Higher Education Review*, 3, 25–49.
- Tandberg, D. A. (2008). The politics of state higher education funding. *Higher Education Review*, 5, 1–36.
- Tandberg, D. A. (2010a). Politics, interest groups and state funding of public higher education. *Research in Higher Education*, 15(5), 416–450.
- Tandberg, D. A. (2010b). Interest groups and governmental institutions: The politics of state funding of public higher education. *Educational Policy*, 24(5), 735–778.
- Tandberg, D. A. (2010c, November). *The conditioning role of state higher education governance structures*. Paper presented at the Annual Meeting of the Association for the Study of Higher Education, Indianapolis, IN.
- Tandberg, D. A., & Ness, E. C. (2011). State capital expenditures for higher education: 'Where the real politics happens'. *Journal of Education Finance*, 36(4), 394–423.
- Tankersley-Bankhead, E. A. (2009). *Student lobbyists' behavior and its perceived influence on state-level public higher education legislation: A case study*. Unpublished doctoral dissertation, University of Missouri, Columbia, MI.
- Thomas, C., & Hrebener, R. (1999). Interest groups in the states. In V. Gray & R. L. Hanson (Eds.), *Politics in the American States: A comparative analysis* (7th ed.). Washington, DC: Congressional Quarterly Press.
- Thomas, C., & Hrebener, R. (2004). Interest groups in the States. In V. Gray & R. L. Hanson (Eds.), *Politics in the American States: A comparative analysis* (8th ed., pp. 100–128). Washington, DC: CQ Press.

- Thompson, J. A., & Felts, A. A. (1992). Politicians and professionals: The influence of state agency heads in budgetary success. *Western Political Quarterly*, 45, 153–168.
- Toma, E. F., Berhane, I., & Curl, C. (2006). Political action committees at the state level: Contributions to education. *Public Choice*, 126, 465–484.
- Toutkoushian, R. K., & Hollis, P. (1998). Using panel data to examine legislative demand for higher education. *Education Economics*, 6(2), 141–157.
- Trostel, P. A., & Ronca, J. M. (2009). A simple unifying measure of state support for postsecondary education. *Research in Higher Education*, 50(3), 215–247.
- Truman, D. (1951). *The governmental process*. Knopf: New York.
- U.S. Bureau of the Census. (2011). *Statistical abstract of the United States*. Washington, DC: U.S. Bureau of the Census.
- Volkwein, J. F. (1989). Changes in quality among public universities. *Journal of Higher Education*, 60(2), 136–151.
- Weerts, D. J., & Ronca, J. M. (2006). Examining differences in state support for higher education: A comparative study of state appropriations for research universities. *Journal of Higher Education*, 77(6), 935–965.
- Weerts, D. J., & Ronca, J. M. (2008). *Determinants of state appropriations for higher education from 1985–2005: An organizational theory analysis*. Madison, WI: Wisconsin Center for the Advanced of Postsecondary Education.
- Zhang, L. (2010). The use of panel data models in higher education policy studies. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. XXV, pp. 307–349). Dordrecht, The Netherlands: Springer.
- Zumeta, W. (1992). State policies and private higher education: Policies, correlates, and linkages. *Journal of Higher Education*, 63, 363–417.
- Zumeta, W. (1996). Meeting the demand for higher education without breaking the bank: A framework for design of state higher education policies for an era of increasing demand. *Journal of Higher Education*, 67(4), 367–425.

Name Index

A

- Abdulkadiroglu, A., 265
 Abraham, C., 393
 Acedo, F.J., 163, 166, 168, 189
 Adam, H.G., 264, 277
 Adamic, L.A., 171
 Adams, H.G., 585, 587
 Adams, J.D., 163, 166, 190, 406, 438
 Adelman, C., 117, 264, 269, 271–273, 275,
 310, 311, 460, 522, 527, 528, 532,
 533, 536, 546
 Adesope, O.O., 383
 Agrawal, A.K., 166, 189
 Aguirre, A. Jr., 591, 594, 597
 Ahlfeldt, S., 55
 Alamos, L., 158
 Alazraki, M., 232
 Alba, R.D., 464
 Albert, N.G., 548
 Alexander, F.E., 460
 Alexander, K.L., 269, 460
 Alexander, L.B., 233
 Alexander, P.A., 378
 Alexander, S., 497, 498
 Alfonso, M., 464, 537
 Allen, D., 157
 Allen, K., 126
 Allen, T.D., 570, 588, 589, 592, 594, 595
 Allen, W.R., 41, 103, 564, 565, 570, 578, 582,
 583, 590, 597
 Allensworth, E., 115, 523, 546
 Allison, C.B., 419, 429, 434, 446, 449
 Allison, K., 97
 Allmendinger, D.F., 444, 445
 Almeida, V., 158
 Almquist, J., 250
 Alon, S., 125, 530, 531
 Alt, J.E., 647
 Altbach, P.G., 62, 82
 Altenbaugh, R.J., 415–418, 420, 431–433, 445
 Altman, D.G., 222, 238
 Altonji, J.G., 274
 Amaral, A., 324, 328
 Amaral, L.A.N., 158, 168
 Anaya, G., 565, 578, 580, 582, 584
 Ancis, J.R., 134
 Anderson, E., 443
 Anderson, G., 537
 Anderson, J.D., 418, 422, 430, 443
 Anderson, M.S., 219, 221, 224, 233, 234,
 239–241, 244–247, 252, 253, 335,
 519, 520
 Andreoni, J., 239
 Andrew, L.D., 465
 Andrews, J.E., 158
 Andrews, M., 356, 371
 Andrews, R.J., 533
 Andrews-Guillen, C., 578
 Andries, P., 173
 Anestidou, L., 247
 Angier, N., 229
 Anglin, D.M., 101
 Angrist, J.D., 265, 272, 274, 277, 283, 287,
 288, 290, 294–296, 299, 300, 303
 Anselmi, K., 565
 Antes, A.L., 236, 249
 Antonio, A.L., 49, 180, 192, 570, 590, 592,
 595–597
 Antony J.S., 586–589
 Antrobus, J.S., 180
 Apostolov, E., 653
 Aragon, S.R., 460, 461

Aral, S., 175, 204
 Arboleda, A., 134
 Arbona, C., 464, 467, 469, 473, 489
 Archambault, E., 163
 Archibald, R.B., 638, 653, 662
 Arcidiacono, P., 182, 192, 538, 542, 543
 Arellano, L., 564
 Ariel, R., 398
 Ariely, D., 239
 Arimoto, A., 323, 329
 Armstrong, W.B., 460
 Arnold, A., 465
 Arredondo, P., 106
 Arrow, K., 539
 Arshan, N., 526
 Arum, R., 84, 562
 Astin, A., 112, 327
 Astin, A.W., 10, 17, 48, 52–54, 72, 84, 85,
 296, 467, 476, 482–484, 487, 574,
 576, 577, 583, 584, 589
 Astin, S., 21, 25
 Atteberry, A., 526
 Attewell, P., 115, 116, 265–267, 273, 274,
 527–529
 Attinasi, L.C. Jr., 104
 Aud, S., 94
 Audretsch, D.B., 164, 166, 191
 Ausloos, M., 157
 Austin, A.E., 221, 574, 576, 585, 586
 Avery, C., 532
 Axelson, R.D., 84, 484
 Ayal, S., 239
 Ayres, O.W., 585
 Azoulay, P., 170, 190

B

Babbage, C., 222
 Babchuk, N., 163, 189
 Babcock, P., 86
 Back, K., 152, 176
 Backes, B., 542, 543
 Baez, B., 570, 572, 592, 595, 596
 Bagde, S., 182
 Bahr, P.R., 460, 461, 464, 465, 470, 477–481,
 485–491, 496–499, 501, 502
 Bailey, D.S., 537
 Bailey, M.E., 641, 662
 Bailey, T.R., 460, 461, 464, 465, 533, 534,
 537, 547
 Baird, L.L., 585, 587
 Baker, D.P., 531
 Baker, G.R., 39
 Baker, R.W., 98, 107, 265

Baker, S., 178, 191
 Baker, T.L., 464
 Baker, V., 567, 568
 Balconi, M., 160, 171, 190
 Baldridge, J.V., 5
 Baldwin, T.T., 180, 191
 Bale, J., 6
 Bamberger, G., 326
 Bandura, A., 120, 121, 575, 576
 Banks, W.M., 569, 590, 592, 594, 597
 Bannon, E., 127
 Banta, T.W., 16, 76
 Barabasi, A.L., 165
 Barber, B.L., 126
 Barber, M.J., 179
 Barbuti, S.M., 531
 Barkley, E.F., 55, 83
 Barlow, A.E.L., 118
 Barlow, E., 465
 Barlow, L., 125
 Barnes, B.J., 585, 586
 Barnes, G., 85
 Barnes, T., 464
 Barnett, E.A., 582
 Barnett, G.A., 176, 177
 Barnett, W., 519
 Barr, P., 13
 Barrett, K.A., 249
 Barrilleaux, C., 647, 659
 Barroso, C., 163
 Barry, C.L., 121, 122, 128
 Basu, P., 229, 230
 Bauer, G., 169, 190
 Baum, C.F., 302
 Baum, S., 128, 532
 Bauman, J.P., 444
 Baumgartner, F.R., 645
 Bayer, A.E., 234
 Bazdaric, K., 235
 Beach, K.D., 468
 Beadie, N., 448
 Bean, J.P., 16, 21, 57, 269, 475, 489, 579, 585
 Bearman, P.S., 167, 189
 Beas, A.M., 460
 Beatty, B., 429, 430, 434
 Beaudoin, L.P., 385
 Beaver, D.D., 157, 168, 172, 198
 Bebeau, M.J., 233
 Beberman, M., 435
 Bechard, J.-P., 161
 Becker, G.S., 111, 238, 491–493, 539
 Becker, W., 347, 356, 370, 371
 Bedell, M.D., 180
 Belcher, D., 574, 586, 587

- Belenky, M., 112
 Belfield, C., 537
 Bell, A.D., 126
 Bellas, M.L., 592, 593
 Bennett, C., 579
 Bennett, D., 26
 Bennett, R.W., 585
 Benschoff, J.M., 93, 106
 Bensimon, E.M., 82, 494, 495, 497, 499, 562, 569, 570, 589, 590, 592–594, 597
 Berends, M., 528
 Berger, D.M., 534
 Berger, J.B., 98, 104, 462, 470, 471, 474–477, 482–488, 497, 583
 Berhane, I., 655
 Berkman, M., 647
 Berkner, L., 127
 Bernal, S., 460
 Bernardin, H.J., 107
 Bernardin, K., 107
 Bernat, D.H., 101
 Berret, D., 371
 Bers, T., 470, 473, 474, 476, 487, 488, 494, 495, 497–499
 Best, G.A., 464, 466
 Bettinger, E.P., 117, 265, 535, 536
 Betts, J.R., 264, 266, 269, 271, 273, 275, 310
 Betz, N.E., 121
 Beyers, W., 107
 Bidwell, C.E., 598
 Bielby, R.M., 265, 277, 278, 312
 Bigatti, S.M., 130
 Bigelow, K.W., 432, 439
 Biggs, J., 389
 Bilic-Zulle, L., 235
 Bill, G.I., 328, 432, 450
 Bird, S.J., 251
 Birnbaum, R., 589
 Biscotti, D., 330
 Bishop, J.H., 271–273, 526
 Bishop, M., 526
 Black, D.A., 533, 646
 Black, G.C., 163
 Blackburn, R.T., 589
 Blackwell, E.A., 656
 Blackwell, J.E., 592, 597
 Blackwell, J.M., 103
 Blader, S.L., 240, 241
 Blaich, C.F., 31, 34, 64, 67, 80, 129, 597
 Blake, J.H., 23
 Bledstein, B.J., 420
 Bliss, L.B., 534
 Blumenthal, D., 240
 Boeke, M., 547
 Bohi, M.J., 410
 Boisjoly, J., 182
 Bok, D., 324, 328, 330, 331, 358, 533
 Bolger, N., 63
 Bollen, J., 158
 Bond, R., 393
 Bong, M., 121
 Bonham, B.S., 534
 Bonous-Hammarth, M., 570, 583
 Borcharding, T., 646
 Borden, V.M.H., 16, 63, 327
 Borgman, C.L., 153
 Borner, K., 158
 Borrowman, M.L., 405, 408, 410, 412–414, 422, 425
 Borsboom, D., 386
 Boschini, V., 15
 Bottrill, K., 327
 Bound, J., 359, 537, 550
 Bourdieu, P., 111, 491, 492
 Bowen, H.R., 53, 54
 Bowen, W.G., 533
 Bowles, T.A., 589
 Bowman, N.A., 97, 130
 Bowman, S.R., 569, 570
 Boyden, A.C., 410
 Boyer, E.L., 85, 562, 597
 Boyer, V., 25
 Boylan, H.R., 534, 535
 Boyles, D.R., 429
 Bozeman, B., 164, 166, 190
 Bozick, R., 96, 123, 124, 130, 266, 268, 275, 460, 523
 Bradburn, E.M., 536, 538
 Bradurn, E.M., 106
 Bragg, A.K., 573–575
 Bragg, D.D., 533
 Brand, B.L., 97, 102
 Branscombe, N.R., 569
 Braskamp, L., 571
 Braunschweiger, P., 250
 Braunwald, E., 222
 Brawer, F.B., 495, 534, 538
 Braxton, J.M., 98, 103, 221, 234, 239, 241, 540
 BrckaLorenz, A., 467
 Breaux, R.M., 443
 Breiger, R.L., 159, 189
 Breneman, D., 327, 334
 Breschi, S., 160
 Brett, B., 581
 Brewer, D.D., 179, 191, 329, 334, 343, 346
 Bridgeman, B., 531
 Bridges, B.K., 30, 34, 35, 73, 78, 564
 Bringle, R.G., 47

- Brint, S., 82, 449, 533
 Broad, W.J., 222, 236
 Brock, M.E., 248, 249
 Brody, S.A., 248, 249
 Brooks, G.P., 464
 Brown, J., 527
 Brown, L., 581
 Brown, M.C., 569, 570, 586
 Brown, R., 13
 Brown, R.P., 249
 Brown, R.T., 417, 445
 Brown, S.D., 121
 Brownell, J.E., 31
 Brownstein, J.S., 169
 Bruce, E., 417
 Brumini, G., 235
 Brunello, G., 182, 192
 Bruning, R., 399
 Brunner, J., 324, 329, 331
 Bryant, A.N., 566
 Buchmann, C., 531
 Buckley, J.A., 30, 35
 Budd, J.M., 234
 Buenavista, T.L., 134
 Bugarin, R., 118
 Bulger, R.E., 226, 247, 250
 Bullock, M., 245, 246
 Bunn, C.E., 464, 465, 470, 471, 474, 477, 478, 483, 485, 486, 488, 497, 499
 Bunnage, J.C., 62
 Burgess, C., 430
 Burgette, J.E., 133
 Burkam, D.T., 266, 268, 518
 Burkum, K.R., 460
 Burley, H., 595
 Burrell, S., 108
 Burrello, L., 21
 Burris, C.C., 115, 116
 Burris, V., 172
 Burroughs, S.M., 570
 Burt, R.S., 179
 Bush, G.H.W., 48
 Butchart, R.E., 424
 Butler, D.L., 235, 242
 Butner, B., 595
 Butts, M., 588
 Byxbe, F.R., 460, 465
- C**
 Cabrera, A.F., 60, 96, 97, 102, 124, 129, 460, 464, 465, 469, 475, 489, 580, 581, 597
 Cabrera, N.L., 96, 123, 564, 584
- Cain, M.C., 410
 Calcagno, J.C., 460, 534, 537
 Calderon, S., 126
 Caldwell, C.H., 101
 Callahan, R., 514
 Camara, W., 296, 531
 Cambridge, B., 34, 78
 Cameron, C.A., 286, 474, 476, 502
 Campbell, C., 60
 Campbell, D.T., 385
 Campbell, F., 519
 Canagarajah, A.S., 134
 Cannella, A.A., 168, 189, 190
 Cano, M.A., 95, 101, 102, 135
 Cantwell, A.M., 82
 Caplow, J.A., 597
 Caporrimo, R., 488, 497
 Caraça, J.M.G., 173
 Card, D., 274, 295, 302, 516, 540, 549
 Card, J., 230
 Card, N.A., 126
 Carey, B., 232
 Carey, J.M., 659
 Carini, R.M., 57, 62, 66, 67
 Carlan, P.E., 460, 465
 Carlo, G., 102, 302
 Carlone H.B., 574, 589
 Carlson, D., 326
 Carlton, D., 326, 330
 Carmack, H.J., 99
 Carneiro, P., 312
 Carolan, B.V., 161, 191
 Carrell, S.E., 182, 192
 Carrol, D., 94
 Carroll, C.D., 528
 Carter, D.F., 8, 16, 97, 104, 107, 108, 125, 132, 312, 469, 565, 574, 575
 Carter, P., 119–120
 Casadevall, A., 237, 238
 Casanueva, C., 163
 Casas, J.M., 121
 Casey, K., 470, 471, 476, 483, 486, 488, 499
 Castañeda, M.B., 96, 102, 124, 469, 489
 Castellino, D.R., 119, 120, 527
 Castillo, L.G., 95, 101, 102, 135, 587
 Cates, E.H., 410
 Cave, M., 327
 Caverly, D.C., 396
 Ceja, M., 93, 95, 101, 128
 Cejda, B.D., 461, 464–466
 Cellini, S.R., 272, 273
 Centola, D., 175
 Cerna, O., 96
 Cervero, R.M., 589

- Chambers, M.M., 615
Chan, A., 238
Chan, J., 538–540
Chang, J.C., 582
Chang, M.J., 566, 572, 580, 584, 590
Chapman, D.W., 238, 563, 584
Charlier, P., 238
Chau, M., 159
Chaves, C., 113
Chavous, T.M., 101–102, 583
Cheadle, J.E., 114
Chemers, M.M., 122
Chen, P.D., 71
Chen, T.-M., 177
Chen, X., 123, 129
Cheng, R., 515
Chesler, M., 593
Cheslock, J.J., 460, 641, 663
Chhuon, V., 134
Chickering, A.W., 21, 25, 49, 54, 85, 105, 107
Child, D.A., 389
Chiranjeevi, P., 231
Chism, N., 16
Chiteng Kot, F., 252
Cho, S.W., 461, 534
Choe, S., 230
Choi, N., 121
Chonko, L.B., 165
Chowdhury, G., 157
Chow-Hoy, T.K., 266
Choy, S.P., 269, 271
Christakis, D.A., 239
Christakis, N., 179, 191
Christensen, C.M., 371
Christenson, S.L., 85
Chubin, D.E., 221
Church, J., 366
Cistone, P.J., 656
Clark, B.Y., 9, 171, 191
Clark, D., 15, 21, 22
Clark, J.B., 450
Clarkberg, M.E., 578
Clarkson, G.S., 171
Claxton, L.D., 235
Clayton-Pedersen, A., 565
Clemmons, J.R., 163
Clifford, G.J., 419, 426–428, 433, 437, 440–442, 445, 448–450
Clinchy, B., 112
Clinton, B., 48
Clotfelter, C.T., 642, 646
Cludts, S., 246
Coate, S., 539
Cobb, C., 527
Cohen, A.M., 495, 534, 536, 538
Cohen, J., 200
Cohen, R.W., 526
Cohen-Cole, E., 204
Cohn, D., 94
Cointet, J.-P., 164, 165, 189
Cokley, K., 564, 583
Cokol, M., 235
Colbeck, C.L., 581
Cole, D.G., 562, 563, 565–567, 578–585, 596
Collins, C., 418, 436
Collins, J.C., 77
Colon, Y., 97, 123
Colyar, J.E., 114, 117
Cominole, M., 127
Conchas, G.Q., 521
Condron, D., 531
Conger, D., 269, 528, 530, 546
Conley, D., 117
Conley, V.M., 464
Connelly, S., 240, 249
Connolly, M.R., 582
Conrad, C., 564, 582, 583
Contasta, D.R., 444
Cook, B., 123
Cook, J.M., 164, 568
Cook, T.D., 385
Cooke, D.Y., 102, 583
Coombes, S., 172
Cooper, A.J., 95
Cooper, J., 107
Corbyn, Z., 235
Cordier, M.H., 424
Coriat, B., 647
Corley, E., 164, 166, 190
Corno, L., 387
Cornwell, C., 270, 648
Corrigan, M.E., 129
Cortes, R.D., 128
Corwin, Z.B., 114
Costantini, A., 189
Cotterell, J., 203
Cotton, S.R., 571, 578
Cottrill, C.A., 158, 190
Coughlin, C.C., 646, 663
Cox, B.E., 571, 578, 584
Cox, M.L., 566, 578, 579, 584
Crane, D., 158, 164, 189
Creamer, E.G., 592, 593
Credé, M., 391, 392, 395
Cremin, L.A., 425, 437, 442, 449
Crisp, G., 124, 125, 465, 561, 568, 577
Crisp G., 577

Crosby, F.J., 586
 Crosby, J.R., 222
 Crosnoe, R., 267
 Cross, K.P., 69
 Cross, P., 21, 25, 54
 Cruce, T.M., 28, 30, 54, 62, 65, 66, 82, 104,
 122, 125, 132, 134, 597
 Cruikshank, K., 418
 Cruz, I., 561, 568, 577
 Csardi, G., 187
 Culnan, M.J., 158
 Cummings, J.N., 169, 190
 Curl, C., 655
 Currie, J., 518
 Cypers, S., 460

D

D'Abate, C., 567, 598
 Dahlander, L., 164
 Dahmus, S., 107, 109
 Dale, S.B., 363, 533, 541
 Dall'Asta, L., 158
 Dalton, B., 266, 268, 275, 312
 Dalton, J., 21
 Dalton, R., 230
 Daniel, B., 266
 Danielson, C., 327
 Dannells, M., 8, 11, 12
 Dar, L., 638–640, 647, 648, 654, 664, 665
 Darity, W. Jr., 119, 120, 527
 Darsee, J., 222, 229
 Das, D., 172
 Dasgupta, P., 231
 Datnow, A., 115
 D'Augelli, A.R., 177, 192
 Daver, Z.E., 119
 Davies, T.G., 470, 471, 473, 474, 476–481,
 483, 486–489, 496, 497, 499
 Davis, A., 63, 119, 120
 Davis, B., 121
 Davis, E.L., 233
 Davis, J.E., 564, 583
 Davis, K.E., 97, 123
 Davis, M., 246
 Davis-Blake, A., 236
 Davis-Kean, P.E., 264
 Dawkins, P.W., 132
 Dawson, S., 181, 191
 Day, R., 592
 de los Santos Alfredo, G., 538
 De Paola, M., 182
 De Pasquale, S., 244
 De Stefano, D., 158, 165
 De Vries, R., 238, 241
 Deacon, R., 646
 DeAngelo, L., 579
 DeAngelo, L., 97, 123
 Deaton, R., 648, 657
 Debackere, K., 153, 173
 Dedman, W.W., 410
 Dee, T.S., 526, 549
 DeFour, D.C., 177, 191
 deGive, M.L., 656
 Deil-Amen, R., 117, 481
 Deke, J., 296
 Del Rios, M., 78
 Delaney, J.A., 614, 665
 Deming, D., 518, 520, 521
 Dempster-McClain, D., 106
 DeNino, W., 230
 Denson, N., 125
 Denyer, D., 179, 191
 Dery, R., 161
 DeSawal, D., 16
 DesJardins, S.L., 125, 130, 273, 311, 312, 464,
 515, 548
 Desmedt, E., 158
 Devenport, L.D., 249
 DeVries, R., 233
 Dewey, J., 426
 Dey, E.L., 538
 Diaz, E., 493–495
 Diaz, P.E., 465
 Diaz-Strong, 128
 Dickersin, K., 238
 Dickmann, E.M., 470, 471, 473, 474,
 477–481, 487, 489, 496,
 497, 499
 Dierking, D.R., 378
 Dietz, J.S., 190
 Dietz, S., 525
 Dill, D., 323–325, 328–332, 334
 Ding, W.W., 164–166, 190
 Ding, Y., 157, 169, 189, 190
 Dixon, R.W., 466
 Dixon-Reeves, R., 574, 586, 587
 Diz, H., 173
 Dodds, P.S., 175
 Doermann, H., 443
 Doerr, J., 7
 Domina, T., 116, 265–267, 273, 274,
 527–529, 540
 Dominus, S., 231
 Dong, Q., 107
 Doreian, P., 159
 Dorogovtsev, S., 165
 Dosi, G., 647

Dougherty, K.J., 460, 461, 464, 466, 474, 475, 533
 Douglass, J.A., 448, 450
 Dovidio, J.F., 178
 Dowd, A.C., 63, 460, 464, 465, 494, 495, 497, 499, 538
 Dowding, K., 648
 Downing, J., 266
 Downs, A., 646
 Doyle, W.R., 460, 533, 536, 541, 614, 646, 648, 657, 665, 666, 671
 Drewry, H.N., 443
 Drummond, J., 597
 DuBois, J.M., 248
 DuBrock, C.P., 132
 Ducor, P., 162
 Duffy, R.D., 130
 Duggan, M.H., 474, 475, 487
 Duncan, G.J., 182, 192, 518
 Dunham, E.A., 449
 Dunlosky, J., 398
 Dunning, D., 397
 DuPont, S., 39
 Durbach, I.N., 159, 190
 Durkheim, E., 99, 466
 Durrington, V.A., 171
 Dwan, K., 238
 Dworkin, S., 476
 Dynarski, S., 265, 521
 Dzuback, M.A., 441

E

Eagan, M.K. Jr., 118, 123, 460, 566, 572, 578, 579, 582–584, 590, 594, 598
 Eagle, N., 202
 Earle, J., 234
 Eastwood, S., 233
 Eaton, S., 57
 Ebadi, Y.M., 170
 Ebberts, L.H., 112, 113
 Ebers, M., 161, 190
 Eble, K., 54
 Eby, L.E., 588, 589
 Eccles, J.S., 182, 264
 Echternacht, G., 296, 531
 Edelman, P., 159
 Edgerton, J., 109
 Edgerton, R., 24, 27, 32, 54, 55
 Edler, J., 171, 172, 189
 Edmonds, A.O., 417
 Edwards, N.W., 410
 Egan, R., 118, 382

Eggleston, L.E., 460, 476, 484, 499
 Ehrenberg, R.G., 50, 85, 268, 460, 465
 Einarson, M.K., 578
 Eisenhardt, K., 651
 Eisenmann, L., 432, 441
 Elling, T.W., 129
 Elliott, E., 648
 Ellis, D., 157, 191, 497
 Ellison, N.B., 179, 181, 191
 Elsbree, W.S., 408–409, 411, 413, 414, 420, 422, 425, 449
 Ely, K., 392, 393, 395
 Emerson, R.M., 572
 Enders, W., 247
 Endo, J., 563, 584
 England-Siegerdt, C., 127
 Ennis, S.R., 548
 Enserink, M., 232
 Ensher, E.A., 572, 591
 Entwisle, D., 460
 Eppler, D., 326
 Epps, E.G., 564, 570
 Epstein, R., 326
 Erdos, P., 159
 Erikson, O.H., 564, 565, 646, 663
 Ericsson, K.A., 397
 Ervin, N., 531
 Erwin, T.D., 129
 Esparza, P., 97, 123
 Espenshade, T.J., 121
 Espinosa, L.L., 96, 564
 Espinoza, A., 566, 580, 583
 Ethington, C.A., 469
 Evans, J.A., 128, 164, 171, 189, 190
 Evans, N., 16
 Evans, S., 164
 Ewell, P.T., 24, 27, 38, 48, 57, 64, 85, 547
 Exum, W.H., 569, 570, 590, 594, 597
 Eyster, E., 538–540

F

Fabes, B., 460
 Falconetti, A.M.G., 460, 464
 Fallows, J., 359
 Fanelli, D., 233, 238
 Fang, F.C., 237, 238
 Faust, K., 155
 Fazio, R.H., 178, 180, 192
 Feld, I.S., 592
 Feldman, D.H., 638, 662
 Feldman, K., 25, 53
 Feldman, L.G., 251
 Felts, A.A., 647

Felts, E., 513, 531
 Fennessey, J., 269
 Fenske, R.H., 132
 Ferligoj, A., 159
 Fernandez, R., 646
 Ferrin, S.E., 656
 Festinger, L., 152, 176, 198
 Feudtner, C., 239
 Filkins, J.W., 470
 Finney, S.J., 121
 Fiorina, M., 659
 Fish, A., 153
 Fisher, A.S., 109, 111, 492
 Fisher, C.B., 251
 Fisscher, O., 246
 Fitzgerald, D.P., 97, 102
 Flaga, C.T., 468, 470, 474, 476, 477, 479, 484,
 486–490, 496, 499, 501
 Flavell, J.H., 379
 Fleck, L., 186
 Fleming, J., 564, 582, 597
 Fleming, L., 166, 190
 Fletcher, J.M., 181, 192, 200, 204, 266, 271
 Flick, A., 84, 484
 Flores, S.M., 128, 513, 541, 648
 Folger, R., 240
 Fontana, R., 167, 189
 Fonte, R., 534, 547
 Foo, S., 157
 Fordham, S., 119
 Fosnacht, K., 60
 Foster, G., 182, 192, 200
 Fowler, H.E., 410
 Fox, M.F., 221, 224
 Franceschet, M., 158, 168, 189, 191
 Frank, K.A., 268, 460
 Franke, R., 664
 Frankel, M.S., 226, 228, 245, 246
 Franklin, B., 408
 Fraser, J.W., 405, 406, 417, 418, 420, 424,
 431, 434–439, 447, 451
 Freeman, K., 564
 Freeman, M.L., 464
 Freeman, R., 237
 Freund, D., 19
 Fried, A.L., 251
 Friedkin, N., 152, 160, 165, 189
 Friedman, M., 331
 Friedman, P.J., 233
 Friedman, T., 331
 Fries-Britt, S.L., 120, 580
 Froman, R.D., 121
 Frost, S.H., 581, 656
 Fryer, R.G. Jr., 538–540

Fullerton, R.L., 182
 Funk, C.L., 249
 Furner, J., 153
 Furr, S.R., 129

G
 Gabriel, K.F., 55
 Gaff, J., 54
 Galán, J.L., 163
 Galbraith, M.W., 118
 Gallant, T.B., 231
 Games, R., 47
 Gamoran, A., 267, 522, 523, 546
 Gamson, Z.F., 25, 49, 54, 562, 598
 Gándara, P., 514
 Garand, J.C., 645, 650
 Garces, E., 518–521
 Garcia, B.F., 122
 Garcia, G.A., 566, 578, 584
 García, T., 382
 Garcia, T.I., 548
 Gardner, J.N., 85
 Gardner, W., 233
 Garner, H.R., 235
 Gasiewski, J.A., 566, 578, 584
 Gasman, M., 128, 443, 444, 573, 587
 Gates, S., 329
 Gawley, T., 476
 Geddes, B., 649
 Geelhoed, E.B., 417
 Geggie, D., 233
 Gehring, D.D., 464, 466
 Geiger, R.L., 330, 447–449
 Geiser, P., 528
 Geiser, S., 266, 271
 Gelso, C.J., 567
 Geltner, P., 477
 George, T., 159
 Gere, A.R., 502
 Getz, M., 358
 Getzlaf, S.B., 103
 Geuna, A., 167
 Geverdt, D., 266
 Giacobini, M., 159
 Gianneschi, M., 641, 663
 Gibb, S., 572, 592, 594
 Gibbs, C.L., 97, 102
 Gibbs, P., 329, 330
 Gibson, S.K., 573
 Giddings, P., 96
 Giles, J., 231
 Gilligan, P., 126
 Gilner, M.D., 586

- Gingras, Y., 161, 163
 Gino, F., 239
 Ginsburg, M.B., 407, 408, 414, 415, 420, 422
 Giordano, G., 165
 Girvan, M., 157, 187
 Gitlin, A., 423, 427
 Gladwell, M., 49
 Glänzel, W., 163, 168, 189
 Glass, J.C. Jr., 464, 465, 470, 471, 474, 477, 478, 483, 485, 486, 488, 497, 499
 Glazer-Raymo, J., 441
 Gleason, M.A., 182, 192
 Glenna, L., 330
 Glennerster, H., 329–331
 Glick, L.J., 233
 Godley, J., 178, 191
 Goffman, E., 497
 Gold, J., 108
 Goldberg, L., 233
 Goldberger, N., 112
 Goldberger, S., 460
 Golde, C.M., 578
 Goldfarb, A., 166, 189
 Goldin, C., 636
 Goldman, C., 329
 Goldrick-Rab, S., 312, 515, 537
 Gomez, 128
 Gong, T., 124, 125
 Gonyea, R.M., 28, 53, 57, 60, 62, 65, 66, 82, 122, 125, 132
 Gonzalez, A., 464
 González, K.P., 492–495
 Gonzalez, M., 179, 191
 Good, J., 133
 Goodchild, L., 410
 Goodlad, J.I., 419
 Goodman, J., 105, 264
 Goodman, K.M., 67
 Goodman, K.W., 250
 Goodstein, D., 221
 Goossens, L., 107
 Gordon, L.D., 440, 441
 Gordy, J.P., 408, 409, 411, 413
 Gorman, T.J., 115
 Gossart, C., 158, 160, 190
 Gøtzsche, P.C., 238
 Goyal, S., 165, 189
 Graff Zivin, J.S., 170
 Grafstein, R., 648
 Graham, A., 49
 Graham, S., 378
 Graver, L., 410
 Gray, V., 650, 655, 656
 Green, D.P., 302
 Green, J.R., 445, 587
 Greenberg, M., 233, 240
 Greene, B., 535
 Greene, J.P., 526
 Greene, T., 69, 585
 Greene, W.H., 286
 Gregerman, S.R., 123, 133, 584
 Gregg, P., 97
 Gregoire, D.A., 161, 190
 Gregory, M., 33
 Gregory, S.T., 591
 Griffin, K.A., 120, 567, 568, 570, 572, 576, 591, 593–595, 597
 Griffin, R., 593
 Griffith, A.L., 131
 Griffith, B.C., 161
 Grinnell, F., 252
 Griswold, C.P., 657
 Grodsky, E., 526, 531, 537
 Groscurth, C.R., 101
 Groskaufmanis, K.A., 246
 Grubb, W.N., 130, 460
 Guba, E., 22
 Guiffrida, D., 574
 Guillory, E.A., 570
 Guimarães, R., 160
 Guimerà, R., 168
 Guiton, G., 267, 268, 528
 Gulbrandsen, M., 171, 189
 Gunsalus, C.K., 242
 Gunter, D.L., 636, 667
 Gurin, G., 538
 Gurin, P., 538, 563
 Guri-Rosenblit, S., 328
 Guthrie, J.R., 419, 427, 440
- H**
 Haahr, M.T., 238
 Haberman, M., 410, 421, 432
 Hackett, E.J., 221
 Hackett, G., 121
 Hadani, M., 172
 Hadwin, A.F., 377, 379, 385, 387, 388, 390, 391, 397
 Hafstad, A., 231
 Hagedorn, L.S., 95, 97, 129, 135, 460, 489, 492, 494, 538, 592
 Hagerdorn, L.S., 597
 Haggard, P., 386
 Hagstrom, W.O., 238
 Hagy, A.P., 532
 Haimson, J., 296
 Hall, A.R., 298

- Hall, G.S., 427
 Hall, R., 338
 Haller, E.P., 389
 Hallinan, M.T., 115, 267
 Halpin, G., 133
 Hals, A., 234
 Halstead, K., 615, 653
 Hamilton, M.H., 16
 Hamm, K., 658
 Han, J.C., 96
 Han, S.-K., 162, 190
 Hancock, G.R., 97, 102
 Handel, S., 497
 Haniff, N.Z., 564
 Hanna, M., 593
 Hanneman, R.A., 82
 Hanney, S., 327
 Hannigan, E.C., 522, 523, 546
 Hansen, M.J., 76, 289, 297
 Harbin, C.E., 470, 471, 477–490, 497, 499
 Harbour, C.P., 460
 Hare, R., 460
 Hargens, L.L., 158, 161
 Hargittai, E., 191
 Harkreader, S., 131
 Harley, D.A., 593
 Harlow, R., 593
 Harman, G., 352
 Harmon, N., 551
 Harpel, R., 563, 584
 Harper, C.A., 409–414, 421, 422, 425, 432, 449
 Harper, C.E., 566
 Harper, S.R., 73, 82, 120, 569, 586, 588
 Harrell, S.P., 120
 Harrington, A.R., 464, 465
 Harrington, J., 269
 Harris, A.L., 541, 546
 Harris, D.N., 515
 Harris, K.R., 378
 Harris, T.A., 122
 Harrison, P.L., 470, 471, 476, 480
 Hart, N.K., 127
 Hartley, M., 47
 Harvey, W.B., 597
 Hasan, S., 182
 Haskins, C.H., 405
 Haslam, N., 168, 190
 Hatala, J.P., 181
 Hathaway, C., 482
 Hattie, J., 389, 390, 395
 Hausmann, L.R.M., 178
 Hawley, T.H., 122
 Hayashi, T., 166, 189
 Hayek, F.A., 331
 Hayek, J.C., 28, 30, 35, 57
 Hayes, D., 330
 Haylo, N., 133
 Haynes, C., 108
 Haywood, A.M., 467
 He, B., 168, 169, 189, 191
 He, S., 127
 Hearn, J.C., 596, 614, 638, 647, 648, 652–659, 653, 654, 656–659, 671
 Heath, C., 397
 Heath, D., 25
 Hecht, P.K., 158
 Heckman, J.J., 312
 Heinrich, J., 239
 Heinze, T., 169, 190
 Heist, P., 9, 10
 Heitman, E., 247, 248, 250
 Heller, D.E., 131, 613, 648
 Hellsten, I., 157, 189
 Hendel, D.D., 464
 Hendrick, I.G., 415, 419, 430, 434
 Hendrick, R.M., 645, 650
 Hendricks, A.D., 597
 Hengstler, D., 469
 Henk, W.A., 390
 Henry, D.A., 233
 Heo, J., 189
 Herbst, J., 415–417, 420, 423, 427, 445, 448
 Hermitte, E., 132
 Hernandez, J.C., 580
 Hernandez, K., 482, 483, 487
 Hero, R.E., 654
 Herrera, A., 460
 Hershbein, B., 359
 Hershberger, S.L., 177, 192
 Heubert, J.P., 115
 Hezlett, S.A., 573
 Hicks, D., 169, 190
 Hill, C., 581
 Hill, P.S., 426
 Hill, R.D., 587
 Hillen, A.F., 522
 Hilmer, M.J., 122, 464
 Hinkle, S., 33
 Hinrichs, P., 542, 543
 Hirsch, B.J., 177, 191
 Hirschfeld, A., 587
 Hirschfeld, L.E., 590, 593
 Hirschy, A.S., 98, 540
 Hoekstra, M., 533
 Hoel, J., 182, 192
 Hoenack, S., 642
 Hoffman, N., 416, 424
 Hofstadter, R., 439

Hogan, S., 482
 Holcombe, R.G., 646
 Holdaway, J., 514
 Holland, P.W., 277, 288
 Hollis, P., 635, 642, 646, 647, 653, 660, 679
 Holme, J.J., 526, 549
 Holmes, H.W., 426
 Holmes, L.S., 112, 113
 Holmes, M.S., 564
 Hom, W.C., 460
 Homans, G.C., 572
 Hong, E., 460
 Hooker, C.H., 576
 Hoover, G.A., 247
 Hoover, H.D., 9
 Hope, R., 118
 Horak, W.J., 390
 Horn, A.S., 241
 Horn, C.L., 541
 Horn, L., 94, 269, 271, 528, 536
 Horowitz, H.L., 441, 446
 Horvat, E.M., 119, 120
 Hossler, D., 16, 19, 31, 653, 666
 Hou, H., 158, 159
 Hovaguimian, K.D., 113
 Howard, D.J., 549
 Howell, J.S., 537, 538, 543
 Hoxby, C., 327, 359
 Hoxby, C.M., 533
 Hoynes, H.W., 549
 Hrebenar, R., 655
 Hróbjartsson, A., 238
 Hu, L., 122
 Hu, S., 68, 82, 109, 111, 124, 125, 132, 492, 565, 579, 581–584
 Hudley, C., 134
 Hughes, J., 131
 Hughes, K.I., 481, 535, 547
 Hughes, R., 66
 Huisman, M., 178
 Huk, I.P., 410
 Humes, K.R., 548
 Humphreys, B.R., 641, 667
 Hunsberger, B., 107
 Hunt, C.W., 414, 421, 432, 439
 Hunt, M., 229
 Hunter, L., 164–166, 191
 Hurst, D.G., 536
 Hurtado, S., 96, 97, 104, 107, 108, 123, 125, 469, 489, 538, 564–566, 572, 574, 575, 578, 579, 582–584, 583, 584, 590, 591, 594, 597, 598
 Husman, J., 378
 Hussar, W., 94

Hutson, A.D., 238
 Hwang, W.S., 230
 Hyman, J.M., 265, 521

I

Iacona, C., 21
 Ianozzi, M., 333
 Iatarola, P., 269, 528, 530, 546
 Igami, M., 161
 Ignash, J.M., 460
 Igo, L.B., 399
 Ikenberry, S.O., 39
 Illich, P., 128
 Imbens, G.W., 287
 Ingels, S.J., 266, 268, 275, 523
 Inkelas, K.K., 94, 119
 Inman, R.P., 653
 Iossifov, I., 235
 Irish, S., 666
 Isbell, E.R., 410
 Ishitani, T.T., 136, 465–467, 473, 483–486, 488, 501
 Iturbide, M.I., 102
 Iverson, M., 226, 247

J

Jackson, A., 581
 Jackson, J., 580, 581
 Jacob, B.A., 526, 549
 Jacob, P., 40
 Jacobi, M., 561, 568, 571, 577
 Jacobs, B., 19
 Jacobsen, G., 234
 Jacobsen, S.J., 250
 Jacoby, W.G., 645, 647
 Jaeger, A.J., 118, 126, 460
 Jain, D., 460, 497
 Jalajas, D., 172
 Jalomo, R.E., 97, 475
 James, E., 334
 James, V., 130
 Jamieson-Noel, D.L., 387
 Jankowski, N.A., 39
 Jaramillo, F., 165
 Jargowsky, P.A., 541
 Jayaraman, K., 231
 Jenkins, D., 460, 533, 537
 Jenkins, K.N., 526
 Jennings, E.E., 41
 Jeong, D.W., 461, 534
 Jeung, C.-W., 161
 Jimerson, J.B., 526

Jo, S.J., 161, 171, 189
 Johanningmeier, E.V., 408, 412
 Johnson, A., 574, 589
 Johnson, B.J., 170, 189, 566–568, 567, 568,
 571, 572, 577, 586–588, 591, 597
 Johnson, D.W., 55, 224
 Johnson, F., 94
 Johnson, G., 324
 Johnson, H.C., 408, 412, 425, 428, 438, 440
 Johnson, J.L., 39, 180
 Johnson, J.M., 441
 Johnson, M.P., 67
 Johnson, R.M., 98, 103
 Johnson, R.T., 55
 Johnson, W.R., 428, 436
 Johnson-Bailey, J., 589
 Johnson-Benson, B., 477, 478
 Johri, N., 166, 169, 190
 Jones, B.D., 645
 Jones, B.F., 163, 169
 Jones, D.P., 48
 Jones, M., 115
 Jones, N.A., 548
 Jongbloed, B., 324, 328–331, 333, 346
 Jongboed, B., 324
 Jonides, J., 584
 Jorgensen, J.D., 67
 Jose, S., 13
 Joseph, T.D., 590, 593
 Jourda, M.-T., 160
 Jovel, J.E., 492
 Jurafsky, D., 166

K

Kaase, K.J., 107
 Kadushin, C., 494
 Kain, J.F., 541
 Kakuk, P., 230
 Kalichman, M.W., 233, 248–250
 Kalish, Y., 202
 Kalman, J., 130
 Kalsner, L., 108, 109
 Kane, T.J., 265, 274, 613, 636, 653, 667
 Kao, G., 532
 Karabel, J., 448, 449, 533
 Karabenick, S.A., 383
 Karki, R., 157
 Karp, M.M., 481
 Karunanayake, D., 576
 Kash, J.P., 131
 Katz, D., 563
 Katz, J.S., 169, 190
 Katz, L.F., 636

Kaufman, J.H., 179, 191, 522
 Kaufman, P.W., 424
 Kaylor, A.J., 464–466
 Ke, W., 158
 Kearney, K.A., 103
 Kearney, P., 586
 Kee, K.F., 181
 Keeling, R., 21
 Keiger, D., 244
 Keith, B., 163, 460, 464, 465
 Keith-Spiegel, P., 242, 253
 Keller, G., 62, 64, 82
 Keller, J.L., 250
 Kelley, K., 97, 123
 Kelly, K., 476
 Kelly, S., 267, 586, 587
 Kelsic, E.D., 179
 Kena, G., 94
 Kennedy, A., 476
 Kennedy, J., 24, 35, 57, 62
 Kennedy, P., 347
 Kennel, R., 121
 Kenny, M., 177, 200
 Keohane, N.O., 597
 Keyte, J., 366
 Kezar, A., 33, 64, 166, 189, 581
 Kick, E.L., 158
 Kickham, K., 672
 Kidder, D.L., 236
 Kiel, L.D., 648
 Kienzl, G.S., 460, 464, 537
 Kiesler, S., 169, 190
 Killian, T., 53
 Kilpatrick, W.H., 426, 427
 Kim, D., 127
 Kim, J.K., 125, 128, 130, 311
 Kim, J.W., 164, 165, 191
 Kim, M.K., 564, 582, 583
 Kim, M.M., 582, 583
 Kim, S., 329
 Kim, Y.K., 580, 581, 583–585
 King, D., 648
 King, J.E., 123, 129
 King, M.C., 470, 583
 King, P., 21, 34
 King, T., 127
 Kingdon, J.W., 645
 Kinkad, J., 584
 Kintisch, E., 231
 Kintzer, F.C., 471, 474
 Kinzie, J., 28, 30, 33–35, 39, 62, 65, 66, 70, 73,
 76, 78, 82, 84, 122, 125, 132, 466
 Kirk, D., 586
 Kiser, L., 648

- Kisker, C.B., 460
 Kite, M.E., 569
 Kivisto, J., 652
 Kivisto, J.A., 652
 Klein, S.P., 66, 67
 Kleiner, B., 527
 Klopfenstein, K., 272, 310, 527, 529–530
 Knoke, D., 151
 Knott, J., 668
 Kobrin, J.L., 531
 Koerner, J.D., 434, 450
 Kogan, D., 118
 Kogan, M., 327
 Kohane, I.S., 169
 Kohn-Wood, L., 101
 Kojaku, L., 269, 271, 528
 Koker, M., 464
 Komives, S., 21
 Kon, A.A., 248
 Koocher, G.P., 242, 253
 Koput, K.W., 189
 Korkmaz, A., 70
 Korn, R., 63
 Korn, W.S., 591
 Koshal, M., 613, 641, 668
 Koshal, R.K., 613, 641, 668
 Koshland, D., 222
 Kossinets, G., 184, 191, 193
 Kotun, D., 460
 Kozeracki, C., 117
 Kozeracki, C.A., 460
 Kraatz, M.S., 172, 191
 Kraemer, B.A., 469
 Kram, K.E., 568, 572, 592
 Krampe, R.T., 397
 Kraut, A., 232
 Kremer, M., 182
 Kress, A.M., 492, 494
 Kretschmer, H., 158, 169, 189
 Kreutzberg, G.W., 236
 Kreuzman, H., 158, 189
 Kronegger, L., 159, 163
 Krotseng, M.V., 107
 Krueger, A.B., 272, 274, 296, 363, 533, 540, 541
 Kuh, G.D., 7–10, 13, 19, 21, 24, 25, 27, 28, 30, 33–35, 39, 40, 49–51, 53, 55, 57, 60–62, 65–69, 71–73, 77, 78, 82–85, 122, 125, 132, 467, 484, 501, 565, 574, 575, 579, 581–585
 Kulick, R., 526
 Kulik, C.C., 389
 Kulik, J.A., 389
 Kuncel, N.R., 391, 392
 Kurlaender, M., 464, 513, 526, 533, 537
 Kurpius, S.E.R., 106
 Kurzweil, M.A., 533

L
 La Nasa, S.M., 460
 Laan, A., 246
 Laanan, F.S., 460, 461, 464, 465, 470, 471, 476–479, 481–484, 486, 487, 491, 493, 495, 497–499, 501
 Laband, D.N., 163, 166, 190, 573
 Labaree, D.F., 415, 419, 433, 448, 449, 451
 Lachman, V., 565
 Lacy, W., 330
 Laden, B.V., 592
 Laender, A.H.F., 158
 LaFollette, M.C., 222
 Lagemann, E.C., 419, 425, 427, 434, 435, 440
 Laham, S., 168, 190
 Lambiotte, R., 157, 158, 164, 189
 Lampe, C., 179, 191
 LaNasa, S.M., 60
 Lane, J.E., 652
 Langdon, W.B., 159
 LaPlant, J., 672
 Lapsley, D.K., 109
 Lareau, A., 114
 Larivière, V., 161, 163, 164, 166, 190
 Larkin, K.C., 121
 Larose, S., 97
 Lasley, S., 131
 Latham, G.P., 380
 Laumann, E., 155
 Lavin, D.E., 116, 117, 464
 Lawrence, J.H., 589
 Layzell, D.T., 460, 653, 661
 Lazega, E., 160, 162, 189
 Lazerson, M., 448
 Le, Q., 133
 Leahey, E., 164–166, 170, 171, 189, 191, 192
 LeDoux, J., 181
 Lee, C., 179, 191
 Lee, J.C., 329, 523, 524, 526
 Lee, K., 169, 191, 270
 Lee, R.M., 234
 Lee, V.E., 115, 266, 268, 460, 464, 518, 523
 Lee, W.Y., 460, 470, 473, 474, 487, 490, 496, 499, 564, 569
 Lee, Y.S., 171, 192
 Leegwater, L.H., 34, 78
 Leinbach, D.T., 533
 Leinbach, T., 460, 537
 Lemieux, T., 274

- Lemonick, M.D., 230
 Lent, R.W., 121
 Lentz, E., 573, 592
 Leonard, J.B., 119
 Lerner, J.S., 584
 Lesar, D.J., 7
 Leslie, L.L., 324, 326, 327, 329–331,
 333–335, 337, 344, 346, 583, 642,
 669
 Leslie, W.B., 450
 Lester, J., 460
 Levey, T., 116
 Levin, H.M., 115
 Levin, J.D., 532
 Levin, J.S., 118
 Levin, R.A., 419, 423, 429, 431, 433
 Levin, S.G., 166, 178, 192, 198
 Levine, D.O., 445, 448–450
 Levine, P.B., 264
 Levy, D.M., 182
 Lew, S., 127
 Lewicki, R.J., 237
 Lewin, T., 513
 Lewis, C., 531
 Lewis, K., 120, 178, 179, 191, 202
 Lewis, L., 535
 Lewis, R.L., 97, 115
 Leydesdorff, L., 163, 165, 189, 190
 Li, J., 533
 Li, X., 551
 Li, Y., 95
 Lieberman, M., 338
 Light, R., 85
 Lin, C.H., 289
 Lin, M.H., 123, 564, 584
 Lincoln, Y., 23
 Lindeen, J.W., 635, 652, 669
 Lindelöf, P., 167, 192
 Lindholm, J.A., 591
 Lindsay, N., 67
 Lissoni, F., 160
 List, J.A., 233
 Little, K., 532
 Liu, T.C.-Y., 159
 Liu, X., 158, 159, 190
 Liu, Z., 158
 Lochner, L., 550
 Locke, E.A., 380
 Locks, A.M., 97, 123, 131, 133
 Lockwood, A., 588
 Loes, C., 66, 67
 Löfsten, H., 167, 192
 Lofstrom, M., 514, 515, 518
 Logan, E.L., 157
 Lohfink, M.M., 125, 129
 London, H.B., 118, 460
 Long, B.T., 117, 131, 312, 359, 464, 533–536
 Long, L.H., 295
 Long, M.C., 269, 528–530, 533, 541, 546, 549
 Longanecker, D., 642
 Loo, C.M., 569
 Looy, B.V., 173
 Lopez, M., 123, 584
 Lorang, W.G., 584
 L'Orange, H.P., 548
 Lorenzo, G., 546
 Lorigo, L., 163, 190
 Loui, M., 242
 Louie, V., 514
 Louis, K.S., 234, 239, 240
 Loury, G.C., 538, 539
 Love, P.G., 574, 575
 Lovell, C.D., 482
 Lovenheim, M., 533, 537
 Lowenthal, P.R., 120
 Lowery, D., 650, 655, 656
 Lowry, R.C., 647, 653, 657, 670
 Lucas, C.J., 415, 432, 434, 435
 Lucas, S.R., 528
 Ludwig, J., 518–521
 Lund, J.P., 666
 Lundberg, C.A., 113, 565, 567, 580,
 581, 585
 Lundberg, S.J., 539
 Lundgren, R., 22
 Lusher, D., 202
 Luthi, L., 159, 165
 Lutkus, A.D., 522
 Luukkonen, T., 162, 167, 190
 Luwel, M., 153
 Lyddon, J.W., 653, 661
 Lyle, D.S., 182, 192
 Lynch, S.M., 121
 Lynn, M., 135
 Lyons, J., 23

M
 Ma, X., 268
 MacCallum, M., 126
 Machung, A., 49
 MacKay, K.A., 565
 Mackun, P., 548
 Macrina, F.L., 226, 249
 Madlberger, M., 168, 190
 Magnuson, K., 518
 Magolda, M.P., 34
 Magolda, P., 33

- Magun-Jackson, S., 133
 Mählick, P., 157, 158
 Mahoney, K.A., 444
 Mahood, W., 450
 Malaney, G.D., 462, 470, 471, 474–477, 482, 483, 485–488, 497
 Malcolm, Z., 125
 Maldonado, D.E.Z., 134
 Malloy, E.A., 47
 Mane, F., 271–273, 526
 Manekin, S., 442, 451
 Manning, E., 94
 Marbley, A.F., 595
 March, J.G., 647
 Marchese, T., 85
 Marcus, A.J., 268
 Marcus, J., 117
 Marginson, S., 323, 329, 330
 Marin, P., 538
 Marine, G.M., 656
 Markowitz, R.J., 423, 424, 446
 Marks, H.M., 125
 Marks, M., 86
 Markus, T.C., 534, 535
 Marlani, V., 515
 Marques, J.P.C., 173, 189
 Marreno, I., 130
 Marris, E., 231
 Marsden, P., 155
 Marshall, A., 332, 335
 Marshall, E., 231
 Marshall, H.E., 410
 Marti, C.N., 60, 66, 69, 585
 Martin, A.J., 120
 Martinez Alemán, A.M., 97, 120, 179
 Martinez, L.M., 593
 Martin-Lohfink, M., 583
 Martinson, B.C., 233, 239, 241
 Marton, F., 61
 Martorell, F., 550
 Martorell, P., 535, 546
 Masse, L.N., 519
 Massy, W., 325, 330, 332, 334
 Matinez-Pons, M., 121
 Matlock, J., 486
 Matt, M., 167
 Mattanah, J.F., 97, 102
 Mattern, K.D., 531
 Mattingly, P.H., 409, 411, 414
 Mattoon, R.H., 460
 Maxwell, M. Jr., 447
 Maxwell, W.E., 460
 Mayer, A., 177, 178, 191, 200
 Mayhew, M.J., 67
 Mazzarol, T., 328
 McAtee, A.B., 93, 106
 McCabe, R., 117
 McCain, K.W., 158
 McCall, B.P., 125, 130, 265, 277, 278, 311, 312
 McCallister, L., 128
 McCamley-Jenkins, L., 531
 McCarroll, J.C., 523
 McCarthy, M.M., 16, 21
 McCauley, D., 528
 McClellan, M., 280
 McClendon, S.A., 98, 540
 McClenney, K.M., 25, 60, 62–64, 66, 69, 585
 McClintock, C.G., 198
 McConnell, M., 9
 McCormick, A.C., 16, 31, 60, 62–64, 68, 70, 71, 73, 82, 84, 86, 467, 469, 474, 475, 477, 500, 537
 McCoy, E., 95
 McCrudden, M.T., 399
 McDaniels, M., 574
 McDonough, M.L., 475
 McDonough, P.M., 49, 126
 McDowall-Long, K., 575, 576
 McDowell, J.M., 164
 McEachern, W., 338
 McEwan, P.J., 182, 192
 McFadyen, M.A., 168, 189, 190
 McFarland, D.A., 164, 166, 170, 190
 McFarlin, I. Jr., 535, 546
 Mcgee, R., 250
 McGowan, J.M., 593
 McGowan, R.A., 476
 McGrath, D., 493–495
 McGuinness, A.C., 657
 McHewitt, E.R., 536
 McKaig, D., 13
 McKay, N.Y., 591, 597
 McKeachie, W.J., 382
 McKinney, J., 129
 McKittrick, S.A., 467, 473, 483–486, 488
 McLaughlin, G.W., 465, 470
 McLendon, M.K., 638, 641, 647, 648, 651–659, 671
 McMahan, D., 233
 McMahan, W., 323
 McManus, S.E., 588
 McMillan, V.K., 460
 McMillen, B., 527
 McNerny, N., 465
 McPherson, M.S., 164, 198, 354, 568, 576
 Mecom, D., 592
 Meek, L., 329, 331, 346

Mehlinger, D.H., 16
 Mehta, S., 55
 Meier, K.J., 641, 648, 652, 653, 657, 658, 660, 672
 Melguizo, T., 460, 464, 465, 538
 Melin, G., 163, 164, 189
 Mellenbergh, G.J., 386
 Mendez, J.P., 125
 Mendoza, P., 125
 Mendoza-Denton, R., 497
 Menendez, A., 329
 Menezes, G.V., 158, 160, 163, 165
 Menges, R.J., 569, 570, 590, 594, 597
 Meredith, J., 161, 190
 Merisotis, J., 117
 Merker, B.M., 107
 Merton, R.K., 221, 237, 238, 244, 245
 Merwin, J.C., 51
 Merz, J.F., 243
 Metcalfe, A.S., 172, 192
 Metcalfe, J.S., 167
 Metzger, W.P., 439
 Metzner, B.S., 475, 489
 Meyer, M.J., 233
 Michalek, A.M., 238
 Milem, J.F., 98, 104, 484, 565, 583
 Miller, D.L., 518–521, 549
 Miller, J., 239
 Miller, M., 397
 Miller, M.F.W., 397
 Miller, P.H., 397
 Miller, S.S., 97, 113
 Miller-Bernal, L., 441
 Miller-Johnson, S., 519
 Milligan, D.M., 465
 Mills, R.G., 169
 Mills, T., 158
 Milojevic, S., 165, 189
 Mina, A., 167
 Minkel, J., 230
 Miquel, J.F., 162
 Moe, T.M., 651
 Moen, P., 106
 Mohr, J.J., 134
 Mokher, C.G., 614, 641, 648, 671
 Molander, E.A., 246
 Molm, L.D., 572
 Monk, C., 32
 Monroe, P., 426
 Montgomery, N., 115, 523
 Montoya, I.D., 246
 Moody, J., 159, 166, 189
 Moon, H.S., 460
 Moore, C., 460, 536, 537

Moore, G., 245
 Moore, J.L., 118
 Moore, J.V.I.I.I., 129, 134
 Mora, J., 329
 Moran, R., 522
 Morel, C.M., 160, 190
 Morelon-Quainoo, C.L., 73, 564
 Moretti, E., 518, 550
 Morgan, D., 672
 Moriarty, D., 581
 Moriarty, J., 526
 Morphew, C., 489
 Mortenson, T.G., 638
 Moses, M.S., 538
 Mosqueda, C.M., 572, 590
 Moss, A.A., 443
 Motohashi, K., 191
 Mounier, L., 160
 Mouton, J., 159
 Moya-Anegon, F., 157
 Mucha, P.J., 179
 Muchnik, L., 175
 Mueller, J., 97, 115
 Mugenda, A.B., 112, 113
 Mulcavy-Ernt, P.I., 391, 396
 Mullen, C.A., 577
 Mullen, J.L., 396
 Muller, C., 514
 Mullin, C.M., 460
 Mullins, N.C., 158, 164, 189
 Multon, K.D., 121
 Mumford, M.D., 236, 239–241, 249
 Murnane, R.J., 278, 280
 Murphy, K.R., 236
 Murphy, S.E., 572, 591
 Murr, C., 126
 Murray, F., 162, 171, 189, 191
 Murray, M.P., 299
 Museum, S.D., 575, 585
 Mustafa, S., 127
 Mustard, D.B., 270, 648
 Myers, H.F., 120
 Myers, R.D., 122
 Myers, S.L., 590, 593

N

Nagda, B.A., 584
 Naidoo, D., 159
 Nakamura, J., 576, 586
 Nardecchia, D., 108
 Nash, M.A., 448
 Natarajan, V., 158
 Natow, R.S., 460

Nauta, M.M., 576
 Navarro, A., 108
 Neale, A.V., 243
 Nekritz, T., 450
 Nelson, C.A., 518
 Nelson Laird, T.F., 16, 61, 67, 73, 78, 564,
 578, 582
 Nelson, L.R., 465
 Nelson, M.L., 158
 Nepusz, T., 187
 Nerur, S.P., 158, 190
 Nesbit, J.C., 383, 391
 Ness, E.C., 646, 655–659, 678
 Nettles, M.T., 129
 Netz, J., 326
 Neuberger, E., 334
 Neumark, D., 268
 Nevill, S., 536
 Newcomb, T., 9, 25, 53
 Newcomb, T.M., 152, 176, 198
 Newell, J., 22
 Newell, L.J., 21
 Newhouse, J., 280
 Newlon, J.H., 427
 Newman, C.B., 566
 Newman, M.E.J., 157–159, 165, 186, 187
 Newmann, F.P., 85
 Ng, P.-H., 159
 Ngu, L.Q., 587
 Ni, C., 189
 Nichols, L., 121
 Nicholson, S., 182, 192
 Nicholson-Crotty, J., 641, 648, 652, 653, 657,
 658, 660, 672
 Nidiffer, J., 444, 445
 Niemi, R.G., 659
 Nijhof, A., 246
 Niskodé-Dossett, A.S., 73
 Nist, S., 396
 Niu, S.X., 541
 Nivison, K., 447
 Noble, J., 443, 531
 Noel, M.X., 161
 Noell, J., 96, 122, 124, 125
 Nomi, T., 115, 523
 Nora, A., 96, 97, 102, 124, 125, 129, 464,
 465, 467, 469, 473, 475, 489, 574,
 580, 597
 North, D., 649
 Nownes, A.J., 655
 Nuñez, A.M., 110, 118, 128, 492, 493
 Nuss, E.M., 40
 Nye, J.G., 417
 Nyrienda, S.M., 124, 125

O

Oakes, J., 115, 116, 267, 268, 522, 528
 Oberg, K., 476
 O'Brien, D.M., 541
 O'Brien, K.P., 121, 450
 O'Connor, C., 97, 115, 119
 O'Donnell, K., 31
 Oettl, A., 170, 191
 Offenstein, J., 536
 O'Gara, L., 481
 Ogbu, J.U., 119, 120
 Ogren, C.A., 415–418, 421, 423, 439, 442,
 443, 445, 446, 448, 451
 Okubo, Y., 162
 Okunade, A.A., 653, 672
 Oliver, A.L., 153, 161, 190
 Oliver, M., 127
 Olmeda-Gomez, C., 157
 Olsen, C.H., 247
 Olsen, D.M., 19, 441
 Olsen, J.P., 647
 Olswang, S., 656
 O'Meara, K.A., 571
 O'Neil, J.M., 586
 Oppenheim, C., 170, 189
 Orbe, M.P., 101
 Orehovec, E., 571, 578, 584
 Orellana-Damacela, L., 578
 Orfield, G., 129, 131
 Orlando, V.P., 396
 Orr, M.T., 514
 Orrego, V.O., 586
 Orszag, P.R., 613, 636, 653, 667
 Oseguera, L., 296
 Oseguera, L.O., 97, 125, 131
 Oshige, M., 397
 Ostrom, E., 645, 647–649
 Ostrom, V., 648
 Ott, M., 125, 130, 548
 Otte, E., 157, 158
 Ouellett, M.L., 593
 Ouimet, J.A., 57, 62, 83
 Outcalt, C.L., 582
 Owen, S.V., 121
 Owens, K.R., 462, 473–475, 477–480, 486,
 488–490, 496, 499, 501
 Owen-Smith, J., 173, 189, 190
 Özman, M., 158, 160, 190

P

Pace, B., 25
 Pace, C.R., 17, 49, 51–53, 54, 61, 66, 72,
 483, 582

- Packwood, B., 11, 12
 Packwood, W., 8
 Padgett, R.D., 67, 129, 565
 Padilla, A.M., 590, 593
 Pajares, F., 121
 Pallais, A., 540
 Pallas, A.M., 269
 Palmer, D.R., 382
 Palmer, M., 14
 Palmer, R., 573
 Pancer, S.M., 107
 Pangburn, J.M., 409, 421, 422
 Panicker, S., 245, 246
 Panzarasa, P., 158, 164, 189
 Paris, D., 80
 Park, B.L., 410
 Park, H.W., 163, 189, 190
 Park, J., 123, 580, 584
 Park, N., 181
 Park, R.L., 230
 Park, S.M., 161, 591
 Parke, S.J., 460
 Parker, F.E., 132
 Parker, J., 182
 Parker, L., 135
 Parsad, B., 535
 Parsons, M., 16
 Pasadeos, Y., 167, 189
 Pascarella, E.T., 10, 25, 30, 33, 34, 52–54,
 58, 64, 66, 67, 72, 84, 97, 103, 104,
 118, 129, 469, 472, 483, 485, 488,
 489, 561, 563–565, 573, 576–579,
 583, 584, 597, 659
 Passel, J.S., 94
 Passeron, J.-C., 111
 Pastor-Satorras, R., 165
 Pathak, P., 265
 Patterson, B.F., 531
 Pattison, P., 202
 Patton, L., 16
 Patton, L.D., 569, 586, 588
 Paulsen, M.B., 125, 129, 132, 583
 Payea, K., 532
 Payne, A.A., 652, 668
 Payne, W.H., 419
 Pearson, A.R., 178
 Pellacini, F., 163, 190
 Pelmonns, D.K., 248
 Peng, S., 536
 Penna, G.O., 160
 Pennington, R., 464–466
 Pennipede, B.S., 76
 Pentland, A., 202
 Pepe, A., 164, 190, 191
 Pepion, K., 587
 Perc, M., 158, 165, 189
 Perez, L.X., 49
 Perez, M.R., 460, 461
 Perez, W., 128
 Perianes-Rodriguez, A., 157, 189
 Perie, M., 522
 Perin, D., 534
 Perkins, L.M., 418, 430, 436, 443
 Perkins, R., 527
 Perna, L.W., 95, 126, 135
 Perrone, F.H., 444
 Perry, N.E., 382
 Perry, P., 460
 Persson, O., 157, 158, 162–164, 167
 Peters, G., 163
 Peters, H.P.F., 157, 159
 Peters, T.J., 33, 77
 Peterson, B.L., 181, 191
 Peterson, H., 3
 Peterson, M., 54
 Peterson, R.G., 641, 652, 658, 673
 Petrovecki, M., 235
 Pfeffer, J., 236
 Phelps, E.S., 539
 Phillips, D.A., 518
 Phipps, R., 117
 Phlegar, A.G., 465
 Pichler, S.C., 533
 Pickering, J.W., 474, 475, 487
 Pierro, D., 642
 Pierson, C.T., 118
 Pike, G.R., 16, 53, 60, 61, 63, 68, 71, 76, 289
 Piland, W.E., 461
 Pilbeam, C., 179, 191
 Pilkington, A., 161, 190
 Pintrich, P.R., 382
 Pischke, J.S., 277, 283, 288, 290, 295, 299,
 300, 303
 Pistole, M.C., 108, 109
 Pitt, H.L., 246
 Planty, M., 266, 267, 273, 275
 Plata, M., 569, 570, 590, 597
 Plax, T.G., 586
 Plemmons, D.K., 248, 249
 Poehlman, E.T., 230, 231
 Ponjuan, L., 514, 521
 Porter, J.D., 132
 Porter, M.A., 179
 Porter, M.E., 593
 Porter, S.R., 60–63, 288, 295, 300
 Portillo, N., 578
 Poteet, M.L., 570
 Potts, D.B., 447

Poulson, S.L., 441
 Powell, A.G., 419, 426, 433, 437, 442, 445
 Powell, L.M., 659
 Powell, W.W., 173, 189, 190
 Pratt, M.W., 107
 Prensky, D., 155
 Pribbenow, D.A., 578
 Price, D.J., 157, 168, 172, 198
 Provan, K.G., 153
 Provasnik, S., 266
 Pryor, J., 97, 123
 Pryor, J.H., 497, 498
 Pugsley, L., 330
 Puller, S.L., 177, 178, 191, 200
 Pungello, E., 519
 Purdie, N., 389
 Putnam, R.D., 491–493

Q

Quanty, M.B., 466
 Quaye, S.J., 73, 82, 566, 575

R

Rabovsky, T., 635, 673
 Radke-Moss, A.G., 441
 Rafaeli, E., 63
 Raffaelli, M., 102
 Ragins, B.R., 592, 594, 595
 Rago, M., 129
 Rainey, K., 132
 Raju, P.K., 94, 95, 133
 Ramage, D., 166
 Ramasco, J., 165
 Ramey, C., 519
 Ramey, G., 642, 669
 Ramin, J., 666
 Ramirez, R.R., 548
 Ramist, L., 531
 Ramlogan, R., 167, 190
 Ramos-Sanchez, L., 121
 Ranis, S.H., 514
 Ransdell, G., 15
 Ranstam, J., 233, 234
 Rasheed, A.A., 158
 Rasinski, K., 57, 383
 Ravello, J.N., 585
 Rawlings, C.M., 170, 190
 Rayle, A.D., 106
 Rayman, P., 581
 Reader, D., 158, 189
 Reardon, S.F., 526
 Rech, J.F., 269

Reddick, R.J., 570, 591, 594, 595
 Redding, A.J., 7
 Redman, B.K., 243
 Reed, D.H., 410
 Reed-Tsochas, F., 158
 Reich, R., 324
 Reid, M.J., 118
 Reikowsky, R.C., 170, 192
 Rendón, L.I., 97, 111–113, 118, 125, 475
 Rennie, S.C., 222
 Repman, J., 171
 Reschly, A.L., 85
 Reschovsky, A., 653
 Resnik, D.B., 221, 245
 Reuter, F.T., 410
 Rewey, K.L., 464, 465
 Reyes, M.-E., 124, 133, 470, 474, 477–481, 483, 486, 488–495, 497, 501, 502
 Reynolds, C.L., 273, 312, 464
 Reynolds, S.M., 234
 Rhine, T.J., 465, 466
 Rhoades, G., 330–332
 Rhoades, L.J., 234
 Rhoads, R.A., 134, 493–495
 Rice, K.G., 97, 102
 Richard, A.J., 246
 Richards, M.P., 526
 Richardson, M., 393, 394
 Richardson, R., 649
 Richman, K.A., 233
 Ridley, D.R., 466
 Rieggle-Crumb, C., 267
 Rifey, N., 345
 Rigby, J., 171, 172, 189
 Riis, P., 237
 Riley, E., 131
 Rilling, J., 239
 Riordan, C., 269
 Rios-Vargas, M., 548
 Rips, L., 57
 Rips, L.J., 383
 Ritzer, G., 330
 Rivas-Drake, D., 97, 115
 Rivenburg, J., 182
 Rizzo, M.J., 639, 648, 653, 674
 Rizzuto, T.E., 181, 191
 Robb, S.R., 125
 Robbins, S.B., 391, 395
 Roberts, J., 652
 Robins, G., 202
 Robinson, D.C., 112, 113
 Robinson, F.P., 396
 Robinson, J.P., 115
 Robinson Kurpius, S., 581

Robinson, P., 107
 Rocha-Singh, I.A., 121
 Rochkind, J., 39
 Rochlin, J.M., 446, 447
 Rodriguez, M.A., 164, 190, 191
 Rodriguez-Esteban, R., 235
 Roey, S., 527
 Rogers, B., 437, 438
 Rogers, D., 410
 Rogers, E.M., 158
 Rogerson, R., 646
 Rohlen, T., 359
 Roksa, J., 84, 460, 464, 465, 536–538, 550, 562
 Rollison, G., 569
 Rom, M.C., 641, 662
 Romano, R., 326
 Romer, P., 347
 Ronca, J.M., 634, 636, 638–644, 648, 653, 664, 679
 Roscigno, V., 531
 Rose, G., 566, 568, 571
 Rose, H., 264, 266, 269, 271, 273, 275, 310
 Rosenbaum, J.E., 117
 Rosenberg, L., 239
 Rosenberg, S., 97, 115
 Ross, S., 387
 Ross, S.A., 651
 Rossner, M., 235
 Roth, C., 164, 165, 189
 Roth, E., 94
 Rothenberg, T.J., 302
 Rothschild, M., 334, 335, 346
 Roueche, J., 116
 Roueche, S., 116
 Rouse, C.E., 274, 533
 Rousmaniere, K., 424
 Rousseau, R., 157, 158
 Rovai, A.P., 181, 192
 Rowan-Kenyon, H.T., 126
 Rowley, S.A.J., 101–102
 Rozada, M., 329
 Roztock, N., 168, 190
 Rubin, B.C., 97, 115
 Rubin, D.B., 277, 287, 297
 Rudebusch, G., 298
 Rudolph, E., 35
 Rudolph, F., 40, 439
 Rugg, H., 427
 Ruiz, A., 497, 498
 Ruiz, S., 97, 123
 Rumyantseva, N., 238
 Rury, J., 407, 444
 Rushin, P.W., 103
 Russell, J.E.A., 425, 588

Russell, W.F., 426
 Ryan, K.J., 224
 Ryle, W.H., 410
 Ryu, M., 561
 Rzhetsky, A., 235

S
 Sabatier, P.A., 647, 648, 650
 Sabloff, P.L., 656
 Sacerdote, B., 182, 192, 198, 200
 Sadler, P.M., 264
 Sáenz, V.B., 96, 514, 521
 Saichaie, K., 67
 Saka, A., 161
 Salazar, M.C., 593
 Salganik, M.J., 175
 Salinas Holmes, M., 73
 Salisbury, M.H., 129
 Sälljö, R., 61
 Sallee, M.W., 126
 Salop, S., 326
 Saltmarsh, J., 47
 Salzinger, L.L., 176
 Sanchez, B., 97, 123
 Sanders, V., 390
 Sandy, J., 464
 Sanford, N., 3, 4, 8, 25
 Sankar, C.S., 94, 95, 133
 Santelices, V., 266, 271, 528
 Sargent, J.F. Jr., 223
 Sarraf, S.A., 467
 Sawatzsky, M., 63
 Sawyer, R., 531
 Sax, L.J., 566, 581, 583, 584
 Scandura, T.A., 592, 594, 595
 Schachter, S., 152, 176
 Schaefer, J.L., 93, 106
 Schaffer, M.E., 302
 Schaller, J., 549
 Schanzenbach, D.W., 265, 521
 Schapiro, D., 328
 Schapiro, M., 354
 Schapiro, R., 230
 Scharnhorst, A., 157
 Scheetz, M., 227
 Scheffman, D., 325
 Scherngell, T., 179
 Schilling, D.A., 248
 Schlossberg, N.K., 105–107
 Schlosser, L.Z., 566–568, 571
 Schmeelk-Cone, K., 101
 Schneider, B., 267
 Schneider, M.E., 97, 101, 102

- Schneider, S.K., 645, 647
Schofield, J.W., 178
Schön, J.H., 230
Schrage, B., 248, 250
Schreiner, L.A., 113, 565, 567, 580, 581, 585
Schroeder, C., 20
Schubert, A., 163, 168, 189
Schuh, J.H., 17, 22, 33, 34, 73, 78, 584
Schulte, A., 382
Schultz, T.R., 234
Schulz, W.G., 231
Schwartz, M.S., 246
Schwartz, R.A., 107–109
Schwarz, M., 61
Schweinhart, L., 519
Schweitzer, J.H., 586, 587
Scoppa, V., 182
Scott, J., 151
Scott-Clayton, J., 535, 547
Šebková, H., 328
Sedlacek, G.M., 103
Sedlacek, W.E., 130, 134
Seier, W.L., 397
Seifert, T.A., 30, 54, 64, 67, 104, 597
Selingo, J., 325, 326
Sellers, R.M., 101–102, 583
Sellnow, T., 55
Sells, L.W., 264
Semadeni, M., 168, 189
Seppa, N., 231
Serido, J., 126
Serna, I., 97, 115, 267
Serruya, S.J., 160
Shadish, W.R., 385
Shaffer, R., 13
Shakespeare, C., 649
Shaman, S., 328
Shamoo, A.E., 233
Shannon, D.A., 425
Shapiro, T., 127
Sharkansky, I., 647
Sharkness, J., 97, 123, 572, 590
Shavelson, R., 385
Shaw, E.J., 531
Shaw, K.M., 118, 460, 534, 535, 551
Shaw, M.A., 238, 246, 247
Shaw, W.M.J., 157
Shedd, P.E., 118
Shelley, M.C., 95, 134
Shelton, J.N., 178, 180
Shenoy, G.F., 39
Shepherd, G., 326
Sheppard, S.D., 55
Shepsle, K.A., 647
Sherman, M., 522
Shernoff, D.J., 576
Shi, X., 171, 191
Shim, S., 126
Shin, J., 370
Shonkoff, J.P., 518
Shook, N.J., 178, 180, 192
Shoup, R., 28, 61, 62, 65, 66, 82, 122, 125, 132
Shulock, N., 460, 536, 537, 649
Shultz, J.B., 224
Shwalb, B.J., 389
Shwed, U., 167, 189
Siang, S., 226
Sidanian, J., 178
Sieber, J.E., 242
Siebert, B., 565
Sieg, H., 326
Siegel, P., 127
Siegfried, J.J., 182, 192, 358
Sievert, M.E., 234
Sigelman, L., 168, 190
Silver, C., 32
Simmons, A., 132
Simon, M.A., 106
Simon, S.A., 588, 589
Simpkins, S., 264
Simpson, M.L., 396
Simpson, N.J., 593
Sinclair, S., 178
Siryk, B., 98, 107
Sitzmann, T., 392, 393, 395
Sivertsen, G., 162, 167
Skahill, M.P., 181
Skarlicki, D.P., 240
Skewes-Cox, T.E., 582
Skopp, D.R., 417
Slaughter, S., 324, 330–332
Smaglik, P., 230
Small, H.G., 161
Smallwood, R.A., 32, 83
Smart, J.C., 469
Smeaton, A.F., 161
Smeby, J.-C., 171, 189
Smedley, B.D., 120
Smerdon, B.A., 266
Smith, A.K., 99
Smith, B., 573
Smith, C.L., 460, 465
Smith, D.A.F., 382
Smith, J.A., 533
Smith, J.K., 164
Smith, J.V., 107
Smith, K.A., 55
Smith, M., 101–102

- Smith, R.A., 181, 191
 Smith, S., 581
 Smith, W.A., 93, 95, 101
 Smith-Lovin, L., 164, 568
 Snijders, T.A.B., 202
 Snow, S.G., 562
 Soderberg, K.A., 182, 192
 Solberg, V.S., 121–122
 Soldner, M., 94
 Soliday, M., 117
 Solomon, B.M., 440
 Solorzano, D.G., 460
 Solórzano, D.G., 93, 95, 101, 135
 Song, C., 460
 Song, F., 238
 Soo, M., 325, 332
 Sopcich, J., 489
 Sorenson, O., 166, 190
 Soucy, N., 97, 101, 102
 Soule, D.J., 9
 Soutar, G., 328
 Sovey, A.J., 302
 Spady, W.G., 99, 466, 563
 Sparling, J., 519
 Spence, M.J., 638–640, 648, 665
 Spielhagen, F.R., 522, 546
 Spiller, P., 325
 Spiro, J., 168
 Sporn, B., 334
 Spuler, A.J., 97, 104, 107, 108
 Squire, P., 658
 Sridhar, D.J., 648
 St. John, E.P., 16, 492
 Stage, F., 16
 Stage, F.K., 103
 Stahl, N.A., 390
 Staiger, D., 274
 Staniec, J., 532
 Stanley, C.A., 593, 595
 Stanton-Salazar, R.D., 110, 128
 Stapel, D., 232
 Starkey, J.B., 132
 Starobin, S.S., 484, 486, 487, 497–499
 Steele, C.M., 579, 585, 587
 Steen, G.R., 235, 237
 Stein, E.L., 573, 574
 Stein, M.K., 522, 524, 546
 Steinberg, S.K., 477
 Steinfield, C., 179, 191
 Steneck, N.H., 219, 220, 222–224, 226–228, 234, 235, 247, 248, 252
 Stephan, P.E., 163, 164, 166, 191
 Stern, S., 237
 Stevenson, D., 531
 Stich, A.E., 117
 Stiglitz, J., 339
 Stillman, S., 302
 Stinebrickner, R., 182, 192, 200
 Stinebrickner, T.R., 182, 192, 200
 Stinnett, T.M., 410, 421
 St. John, E.P., 96, 97, 109–111, 122, 124, 125, 132
 Stock, J.H., 274, 298, 299
 Stofer, R., 160
 Stokman, F.N., 178
 Stoll, N., 366
 Stoltenberg, C., 231
 Stoner, C., 492
 Strange, C., 11, 12, 23
 Strathman, J.G., 641, 675
 Strayhorn, T., 565, 580
 Stryker, S., 177
 Suarez-Balcazar, Y., 578
 Sudbø, J., 231
 Suh, S.A., 570
 Suitor, J.J., 592, 593
 Sullivan, A.V., 98, 103
 Suls, J.M., 397
 Summerlin, W., 229
 Sun, J., 537
 Sundararajan, A., 175
 Sunstein, C., 159
 Suplee, P.D., 565
 Surette, B.J., 460
 Sutton-Haywood, M., 132
 Svanum, S., 130
 Swaner, L.E., 31
 Swanson, C.B., 267
 Swazey, J.P., 233
 Sweeney, J.K., 118
 Swofford, S.C., 502
 Sydow, J., 153
 Sylvia, C.L., 460
 Szelenyi, K., 591
- T**
 Tabachnick, B.G., 242
 Tai, R.H., 264
 Tampubolon, G., 167
 Tan, D.L., 569, 570, 597
 Tandberg, D.A., 614, 638–640, 646, 648–650, 652, 654–660, 676–678
 Tankersley-Bankhead, E.A., 656
 Tao, S., 107
 Taramasco, C., 164, 191
 Tarule, J., 112
 Tavris, C., 9

- Tavis, T., 9
 Taylor, E., 586–589
 Taylor, G., 536
 Taylor, M., 641, 662
 Teichler, U., 328, 370
 Teixeira, P., 324, 328, 330
 Tekleselassie, A.A., 128
 Tenenbaum, H.R., 586–588
 Teranishi, R., 649
 Terenzini, P.T., 10, 21, 25, 30, 52–54, 58, 62, 72, 82, 84, 97, 103, 112, 113, 118, 129, 470, 483, 485, 488, 561, 563, 565, 576–578, 581–584, 597, 659
 Terenzini, R., 566
 Tesch-Romer, C., 397
 Tevaarwerk, K.L., 387
 Thacker, L., 49
 Thelin, J., 16
 Thelin, J.R., 439
 Theophilides, C., 584
 Thomas, C., 572, 655
 Thomas, D., 518
 Thomas, M.K., 272, 310
 Thomas, S.L., 181, 191
 Thompson, J.A., 647
 Thompson, J.S., 532, 579
 Thompson, N., 49, 50
 Thorndike, E., 426
 Thune, T., 167, 191
 Thurmond, K.C., 465, 466
 Tienda, M., 181, 192, 200, 530, 531, 541, 546
 Tierney, W.G., 95, 98, 101, 103, 114, 126, 135, 475, 562, 569, 570, 574, 589, 590, 592–594, 596, 597
 Tight, M., 158, 190
 Tijssen, R.J.W., 167
 Tinto, V., 4, 20, 25, 52, 98–101, 103, 104, 122, 129, 269, 466, 468–472, 474–476, 480, 484, 563, 569, 574, 577, 580, 584, 596
 Titsworth, B.S., 99
 Titus, M., 95, 135
 Titus, S.L., 234, 251
 Tobin, E.M., 533
 Todd-Mancillas, W.R., 586
 Toews, M.L., 108
 Tolbert, C.J., 654
 Tolley, K., 448
 Tollison, R.D., 163, 166, 190
 Toma, E.F., 655
 Tomassini, M., 159, 160, 165
 Torres, J.B., 121–122
 Torres, V., 16
 Toth, C.M., 502
 Tourangeau, R., 57, 62, 383
 Toutkoushian, R.K., 327, 344, 367, 370, 592, 593, 635, 642, 646, 647, 653, 660, 679
 Tovar, E., 106
 Towles-Schwen, T., 178, 180, 192
 Towne, L., 385
 Townsend, B.K., 460–462, 464, 465, 468–481, 484–491, 496–499, 501
 Townsend, M.E., 425
 Tozzi, M.H., 131
 Trail, T.E., 178, 180, 192
 Transgrud, H., 60
 Traud, A.L., 179
 Trent, W.T., 514
 Trivedi, P.K., 286
 Trombley, W., 117
 Trostel, P.A., 515
 Trostel P.A., 634, 636, 638–644, 664
 Trow, M., 9
 Trujillo, A., 493–495
 Truman, D., 655
 Trump, D.L., 238
 Tsakiris, M., 386
 Tseng, B.L., 171
 Tsui, L., 581
 Tuitt, F., 593
 Turner, B., 580
 Turner, C.S.V., 460, 590, 593
 Turner, H.A., 198
 Turner, S.E., 513, 537, 540
 Tuttle, T., 129
 Twale, D.J., 573
 Twombly, S., 489
 Tyler, J.H., 514, 515, 518
 Tyler, R., 51
 Tyler, T.R., 240, 241
 Tyson, B., 27
 Tyson, K., 119, 120, 527
 Tyson, W., 27

U
 Umbach, P.D., 66, 67, 118, 566, 570, 578, 582, 590, 594
 Underwood, D., 130
 Underwood, K., 415, 416, 432
 Unmuth, K., 522
 Upcraft, L., 97
 Urzua, S., 312
 Usdiken, B., 167, 189
 Useem, E.L., 267
 Utterback, J.M., 170
 Uzzi, B., 158, 163, 168

V

Vaala, L.D., 470, 473
 Vader, D., 27, 28
 Valadez, J.R., 492–495
 Valcke, M., 158
 Valente, T.W., 171
 Valentine, T., 589
 Valenzuela, S., 181, 191
 Van Buskirk, W., 493–495
 Van de Sompel, H., 158
 van der Leij, M., 165, 189
 van Duijn, M.A.J., 178, 191
 Van Gennep, A., 98–101
 van Heerden, J., 386
 Van Laar, C., 178, 192, 198
 van Vught, F., 329
 Vanlandingham, G., 131
 VanRaan, A.F.J., 157, 159
 Varlotta, L., 461
 Veazey, B.D., 118
 Veblen, T., 329
 Vega, I.I., 131
 Velasco, P., 566
 Vélez, W., 464
 Venegas, K.M., 126
 Verbeek, A., 153
 Vesper, N., 49, 582
 Vespignani, A., 158
 Veysey, L.R., 439
 Vigil, J.D., 521
 Villareal, P., 121
 Villarejo, M., 118
 Vitale, M.P., 158, 165
 Vogel, G., 230, 232
 Vogt, K.E., 119
 Volkwein, J.F., 470, 472, 583, 613
 Von Hippel, W., 584
 Vreeland, R.S., 598
 Vultaggio, J., 587
 Vytlačil, E.J., 312

W

Wade, J.C., 101
 Wade, N., 222
 Wade-Golden, K., 486
 Wager, E., 235
 Wagner, C.S., 163, 165, 189, 190
 Wagner, R.W., 312
 Wakefield, A., 231
 Walberg, H.J., 389
 Waldeck, J.H., 586–588
 Waldinger, F., 170, 190
 Wallace, M.L., 161, 170, 190

Wallis, C., 230
 Walpole, M., 49
 Walston, J., 523
 Walton, J.M., 575, 576
 Wang, J., 170
 Wang, X., 94, 249, 460, 464, 465, 486, 489–491
 Wang, Y., 134
 Warburton, E.C., 118
 Ward, C., 476
 Ward, D.J., 97
 Ward, K., 84, 466
 Ware, R., 366
 Warren, D., 407, 408, 431
 Warren, J.R., 526, 531
 Warren, R.W., 526, 549
 Wartman, K.L., 179
 Wascher, W., 268
 Washington, C.M., 107, 108
 Wasserman, S., 155
 Wasseur, F.W., 178
 Wassmer, R., 460, 493, 538
 Waterman, R.H., 77
 Waters, E.B., 105
 Waters, T., 460
 Watkins, D., 158, 189
 Watts, D.J., 175, 184, 191, 193
 Wawrzynski, M.R., 566, 578, 582
 Weber, J., 132
 Webster, C.M., 179, 191
 Wechsler, H., 448
 Wedham, E., 489
 Weerts, D.J., 648, 653, 679
 Wei, C.C., 127
 Weick, K., 22
 Weick, W., 41
 Weidman, J.C., 104, 573, 574, 586
 Weiler, K., 424
 Weiner, R., 3
 Weininger, E.B., 116, 117, 464, 465
 Weinstein, C.E., 378, 382
 Weisman, J., 119
 Wejnert, C., 178, 191
 Wells, A.S., 97, 115, 267
 Welner, K.G., 115, 116
 Welsh, R., 330
 Wenger, N.S., 234
 West, J.E., 182
 West, T.V., 178, 180, 192
 Westfall, S., 666
 Whalen, D.F., 95, 134
 Whaley, T.J., 97, 102
 White, D.R., 189
 White, H.D., 158

White, J.W., 120, 122
 White, L., 326, 334, 335
 Whitt, E.J., 22, 23, 33, 34, 73, 78, 584
 Whitt, L., 33
 Wicher, C.P., 238
 Wiebe, R.H., 420
 Wilcox, D., 298
 Wilkinson, L., 514
 Willett, J.B., 278, 280
 Williams, 444
 Williams, B.N., 569, 570, 590, 592, 594, 595, 597
 Williams, D.W., 11
 Williams, G., 324, 329–331
 Williams, J.M., 73, 564
 Williams, P., 235
 Williams, S.M., 569, 570, 592, 594, 595, 597
 Williamson, O.J., 413
 Willis, G.L., 635, 652, 669
 Wilson, B., 571, 578
 Wilson, K.B., 460–462, 468–481, 484–491, 496, 499, 501
 Wilson, R., 562, 563, 566, 579
 Wilson, S., 548
 Wilson, T., 157
 Wimmer, A., 178, 179, 191, 202
 Winkler, A.E., 166
 Winkle-Wagner, R., 95, 97, 101, 102, 111
 Winne, P.H., 377–379, 381–388, 390, 391, 397, 398
 Winston, G., 182, 192, 198, 324, 327, 333, 344, 352
 Winters, M.A., 526
 Wise, J., 232
 Wise, K.S., 64, 80
 Wofford, K.V., 422
 Wolf-Wendel, L., 84, 466–469, 472, 477, 482–485, 489–491, 493, 495, 497
 Wolniak, G.C., 30, 54, 67, 104, 118, 597
 Wood, F., 329
 Woodring, P., 421, 422, 432
 Woods, R.L., 178
 Wooldridge, J.M., 284, 286, 287
 Wright, D.E., 251
 Wright, D.S., 410
 Wright, I., 538
 Wright, J.H., 298
 Wright, T.M., 103
 Wrightsman, L.S., 586
 Wu, R.Y., 176
 Wuchty, S., 163, 168, 198
 Wymelenberg, S., 230
 Wynyard, R., 330

X

Xiao, J.J., 126
 Xu, J., 159

Y

Yakusheva, O., 549
 Yamada, K.M., 235
 Yan, E., 169, 190
 Yancy, D.C., 132
 Yang, C.H., 189
 Yang, S., 151
 Yang, Z., 165
 Yazedjian, A., 108
 Ye, F., 178
 Yeung, Y.-Y., 159
 Yogo, M., 298, 299
 Yonezawa, A., 329
 Yonezawa, S., 97, 115, 267
 Yonge, G., 9
 Yoon, H.J., 161
 Yorke, M., 328
 Yosso, T.J., 93, 95, 101, 109, 134, 135
 Young, A.A., 593
 Young, J.W., 63, 531
 Young, S.P., 648
 Yuret, T., 538

Z

Zaccarin, S., 158
 Zajacova, A., 121
 Zamani, E.M., 460
 Zarkesh, M., 460
 Zeggelink, E.P.H., 178
 Zeitlin, A.N., 534, 535
 Zeldin, A.M., 121
 Zemsky, B., 26
 Zemsky, R., 328, 333
 Zhang, J., 94
 Zhang, L., 659, 660
 Zhao, C., 55
 Zhou, M., 382, 387
 Zimmerman, B.J., 121
 Zimmerman, D.J., 182, 192, 198, 264
 Zimmerman, M.A., 101
 Zimmermann, E., 153
 Zirkle, C., 266, 271
 Zis, S., 547
 Ziviani, N., 158
 Zlotkowski, E., 47
 Zuckerman, H.A., 228, 235
 Zumeta, W., 621, 657
 Zusman, A., 562, 592

Subject Index

A

Academic

- capital, 495
- integration (*see* Integration, community college students)
- involvement (*see* Involvement, community college students)
- performance, 465–466

Academic capital formation (ACF)

- balanced access, 110–111
- defined, 109–110
- “habitual patterns”, 111
- social reproduction theory, 111

Academic support, 94, 97, 133

“Access” institutions

- community colleges, 533, 534
- developmental/remedial education, 534–536
- transfer, community college, 536–538

ACF. *See* Academic capital formation (ACF)

ACPA. *See* American College Personnel Association (ACPA)

Adjustment, community college transfer students

- academic and social, 471, 487, 495
- evolution of students, 501
- measures, L-TSQ, 476
- social, 476, 477

Adjustment to college

- investigations, Latino/a students, 104
- psychology, 105
- SACQ measurements, 107
- students’ socialization, 101, 104
- and student transition, 95

Advanced placement courses, 529

Advising

- academic, 571
- description, 567–568
- and mentoring, 598
- responsibilities, 594
- student groups, 589, 598

Affirmative action

- as intervention
 - college admissions, 540–541
 - color-blind admissions approach, 539–540
 - multiple admissions plan, 540
 - “no loan” policies, 540
 - scholarship, 539
 - student outcomes, 539
- state bans, 542–543
- underrepresented students, elite institutions, 538

African Americans

- adolescent boys, 119
- and Asian American college students, 130
- and Latina/o students, 115, 119, 127
- men, 108
- NCES, 94
- parents, 128
- students, 103, 125, 129, 132
- teachers, 418, 422, 436
- women, 95–96, 106

Agency, exercise, 387

Algebra I, 267, 268

Algebra II

- causal effect, 277, 278
- and college completion, 279
- defiers, 288
- endogeneity, 291–292

Algebra II (*cont.*)

- high school diploma, 275
- instrument relationships, 299
- models, bachelor's degree attainment, 308–309
- models, first-to second-year persistence, 306–307
- performance, college-level quantitative coursework, 269
- positive impact, degree completion, 271
- unemployment rates, 288

Alumni studies, 10, 35–37

American College Personnel Association (ACPA), 20–21

ASHE. *See* Association for the Study of Higher Education (ASHE)

Asian Americans

- and African American college students, 130
- ethnic groups, 94
- and Latina/o college students, 126

Assessment

- arena, 34
- director, 32
- movement, 18, 23
- office, 12, 26
- project, 18
- student development, 10
- student learning outcomes, 37

Association for the Study of Higher Education (ASHE), 17, 22, 35

ATN group. *See* Australian Technology Network (ATN) group

Attainment

- baccalaureate, 461, 463–465, 481, 489
- postsecondary, 459

Australian Technology Network (ATN) group, 352

B

Baccalaureate degree, 460–461

Bachelor's degree

- academic performance, high school, 296
- Algebra II
 - causal effect, 284
 - endogeneity tests, 291
 - HSB survey data, 271
 - LIML model, 299
 - models, 308–309
- attainment model, 299
- attainment results, 310
- NELS, 304
- variable, 282

Black higher education, 444

C

Capital, community college students

- academic, 494
- cultural
 - defined, 491–492
 - measurements, 493–494
- determinations, 495–496
- human, 492
- social
 - defined, 491–492
 - measurements, 494
- transfer student, 495

Carnegie Commission on Higher Education (CCHE), 332

Catholic higher education, 444

Causal inference, 270, 275, 277, 311, 312

CCHE. *See* Carnegie Commission on Higher Education (CCHE)CCSSE. *See* Community College Survey of Student Engagement (CCSSE)

Census data, higher education state expenditures, 626–628

Center for Survey Research (CSR), 24, 28, 35

Center of Inquiry in the Liberal Arts (CILA), 80–81

CES. *See* College Experiences Study (CES)CIC Projects. *See* Council of Independent Colleges (CIC) ProjectsCILA. *See* Center of Inquiry in the Liberal Arts (CILA)Citation. *See also* Co-citation

- “actors”, 156
- author citation analysis, 160
- Science Citation Index, 161, 162
- small-world network, 161

CITI. *See* Collaborative Institutional Training Initiative (CITI)

Co-authorship

- author's productivity, 173
- core-periphery structure, 158–159
- “Erdos number”, 159
- experimental fields, 159
- natural sciences and engineering, 163
- network analysis, 157, 158
- paper's impact, 173
- publication quantity, 168
- social stratification, 169
- “thought community”, 186

Co-citation

- article network, 187, 188
- author co-citation analysis, 157
- clusters, 188, 193–195
- faculty-centered articles, 193, 194
- information, articles, 187, 189–192

- integrating texts
 - betweenness titles, 196–197
 - cross cluster co-referencing
 - patterns, 200
 - peer effects, 198
 - prejudice, in-group/out-group bias, 198
 - reference overlap, clusters, 198, 199
- longitudinal study, 161
- modularity, 187
- Newman-Girvan algorithm, 187
- one-mode network, 186–187
- organization studies, 167
- two-mode network, 186
- Codes of conduct
 - aspirational codes, 245–246
 - description, 245
 - educational and normative codes, 246
 - regulatory codes, 246
 - research integrity, 246–247
 - The *Singapore Statement*, 247
- Collaboration
 - academic collaboration networks, 158, 160
 - “complementary specialist” style, 170
 - European computer science collaboration
 - network, 160
 - faculty, 175
 - gender-based homophily, 164
 - government sponsorship, 166
 - humanities, 163
 - interinstitutional, 162, 163
 - interuniversity, 171
 - multi-university, 169
 - “optimal” amount, 173
 - preferential attachment, 165
 - three-stage model, university, 166
- Collaborative Institutional Training Initiative (CITI), 226, 249
- College
 - access
 - class size reduction and college
 - completion, 521–522
 - disadvantaged and minority
 - students, 534
 - high school completion, 514
 - K-16 approach, 514
 - math proficiency standards, 523
 - P-16 policy research, 551
 - preschool and college completion,
 - 518–520
 - sector, 532–533
 - campus, 204
 - community (*see* Community colleges)
 - elite colleges and universities
 - affirmative action, intervention, 539–541
 - percent plan, intervention, 541–542
 - state bans, 542–543
 - underrepresented students, 538
 - friendship
 - diversity, 203
 - formation, 152
 - groups, 176
 - “invisible college”, 157–158
 - race and ethnicity, student attitude, 195
 - residential, 185
 - retention and achievement, 152
 - social structure, 185
 - student
 - community, 582
 - first-generation, 565, 583
 - networks, 203
 - outcomes, 202
 - student-faculty interactions, 566
- College and university cultures, 5, 22, 39–41
- College Experiences Study (CES), 22, 23
- College student experience questionnaire (CSEQ), 17–19
- Collegiate quality, 3, 26, 27
- Community colleges
 - college career, 533
 - faculty and administrators, 534
 - functions, 534
 - higher education, 550
 - low-income students, 533
 - postsecondary entry, 533–534
 - remediation, transfer and articulation data,
 - 546–547
 - student engagement, 68–69
 - students
 - academic performance, 465–466
 - area of inquiry, 460, 461
 - completion, baccalaureate degree,
 - 463–465
 - construction, data collection
 - instruments, 500
 - environmental pull, 488–491
 - integration (*see* Integration, community college students)
 - involvement (*see* Involvement, community college students)
 - NSSE, 467
 - objectives, 462
 - post-transfer transition processes,
 - 461–462
 - public postsecondary institutions, 460
 - theory of suicide, 466
 - transfer receptivity, 496–500
 - transfer, structural conditions and degree
 - completion, 536–538

Community College Survey of Student Engagement (CCSSE)
 construction, underrepresentation, 63
 and NSSE
 benchmarks, educational practice, 58, 60
 director, 25
 measures validation, 64–66
 web site, 62
 Competition, higher education markets
 CCHE, 332
 institutions, donative resources, 333
 “seven segment market taxonomy”, 333
 “Concerted cultivation”, 114
 Conditions, operations, products,
 evaluations and standards (COPES)
 model, 381
 Connecting the dots (CTD), 65
 Control function models, 302–303
 COPES model. *See* Conditions, operations,
 products, evaluations and standards
 (COPES) model
 Council of Independent Colleges (CIC)
 Projects, 80
 CSEQ. *See* College student experience
 questionnaire (CSEQ)
 CSR. *See* Center for Survey Research (CSR)
 CTD. *See* Connecting the dots (CTD)

D

Data, state higher education funding sources
 categories, appropriations and
 expenditures, 616–617
 Census, 626–628
 correlation analysis, 632, 633
 expenditures, 633
 Grapevine report, 622–624
 NASBO, 617, 620–622
 NCES, 628–630
 organizations, 615–616
 SHEEO-SHEF, 624–625
 state general fund appropriations
 and expenditures, 631
 Degree. *See* Baccalaureate degree
 Degree attainment
 Algebra II (*see* Algebra II)
 curricular intensity, 270
 HSB survey data, 271
 improved academic performance, 269
 math coursework, 271
 student self-selection, 269
 trigonometry, 271
 urbanicity, students, 273

The Delta Cost Project, 629
 Demography
 American Community Survey, 544
 Census data, 545
 community colleges, 546–547
 early childhood/middle school/high school
 education data, 545–546
 educational attainment
 American Community Survey
 data, 517
 degree attainment and crime, 518
 demographic indicators, 515
 US population, college and high school
 diploma, 516–517
 P-16 pipeline, 544
 state administrative databases, 547–548
 Developmental relationships
 description, 567
 psychosocial outcomes, 594
 Disciplines
 academic, 169
 and departments, 173
 descriptive studies, 159
 non-monotonic relationship, collaboration
 and productivity, 173
 Diversity
 campus activities, 590
 student body and faculty, 595
 White institutions, 570

E

Economics
 characteristics, markets, 336–337
 industry vs. market, 337–338
 product differentiation, 341–343
 structures, 338–341
 Economics journals, 193
 Educational attainment, demography.
 See Demography, educational
 attainment
 Educational practice
 effectiveness, 52, 77, 78, 81
 NSSE and CCSSE benchmarks, 58, 60
 Educational quality, 49, 50, 74, 78
 Education (‘ed’) schools
 elite eastern universities, 428
 function, 438–439
 professionalism, 427
 Efficiency
 “efficiency wage hypothesis”, 345
 markets, 369
 Elite colleges and universities. *See* Privilege
 institutions

Employment, finances and transition to college
 community college students, 130
 first-generation college students, 129
 GPA, 130
 NSSE, 129
 Engagement
 and involvement, 484
 students' behaviors, 467
 students, NSSE data analysis, 467
 Environmental pull, community college
 students
 defined, 488–489
 determinations, 490–491
 measurements, 489–490

F

Faculty. *See also* Faculty research,
 student-faculty interaction
 career, outcomes
 reciprocity, 593–594
 scholarship, 593
 service, 592
 literature
 homophily and propinquity, 183
 knowledge generation, 184–185
 networks, dependent variable, 180
 mentoring relationships, 591
 psychosocial outcomes, 594–596
 universities, work sites
 dependent variable networks,
 163–167
 descriptive work, 157–163
 independent variable networks,
 167–175
 knowledge production, 156
 Faculty research, student-faculty interaction
 frequency
 Black professors, 591
 cultural taxation, 590
 women, 591
 outcomes
 career, 592–594
 mentoring relationships, 591
 psychosocial, 594–596
 service, 589
 Federal Policy on Research Misconduct,
 219, 224
 Finance
 associate level institutions, 354
 Bachelor's degree, 354
 Doctor's degree, 354
 financial aid policy, 326
 graduate students, 354

Financial aid
 changing tides, federal-level merit-based
 aid, 131
 literacy, 126
 loans, 127
 types, 125–126
 First-year college experiences, 95, 98,
 104, 135
 Flaga's model, 468–469

G

Google Scholar, 153
 GPA. *See* Grade point average (GPA)
 Grade point average (GPA)
 and course grades, 130
 employment, 130
 first-year, 125
 freshman, 392
 quantitative research, 126
 undergraduate, 122
 White and Latina/o student, 108
 Graduate and professional students
 academic outcomes, 587
 socialization, 586–587
 social support and sense of belonging,
 588–589
 student-faculty interaction, frequency,
 585–586
 Graduate education
 relationships, 585
 socialization, 573
 US model, 586
 Graduate record examination (GRE)
 scores, 67
 Grapevine report
 benefits, 623
 drawbacks, 623
 state tax effort, higher education, 624
 tax-generated data points,
 622–623
 GRE scores. *See* Graduate record examination
 (GRE) scores

H

Hampton-Tuskegee model, 418–419,
 422, 443
 Health and Human Services (HHS)
 investigating and reporting
 fraud, 222
 misconduct statistics, 234
 ORI's educational mission, 226
 HHS. *See* Health and Human Services (HHS)

Higher education. *See also* Social network analysis (SNA)

- appropriations
 - correlation analysis, 632, 633
 - description, 616, 646
 - Grapevine report, 622–624
 - NCES, 628–630
 - per FTE, 641
 - previous appropriation levels, 653
 - principal-agent theory, 651–652
 - SHEEO-SHEF, 624–625
 - state general fund appropriations and expenditure data sources, 631
 - state tax fund, 638
 - studies of state, 662–679
- business, 4–6
- finance, SHEF data (*see* State Higher Education Finance (SHEF) data)
- industries
 - AAUP, 332–333
 - CCHE, 332
 - deregulation, 331–332
 - “seven segment market taxonomy”, 333
- markets (*see* Markets, higher education)
- policy
 - governance structure, 657
 - interest groups, 655–656
 - IRC, 649
 - “new institutionalism”, 648
 - principal-agent theory, 651–652
 - program orientation and culture, 15–17
- High performing institutions, 22, 33
- High school coursetaking
 - human capital development, 269
 - positive and negative selection, 270
 - student self-selection, 269–270
- High school exit exams
 - California, 526
 - and racial achievement gap
 - college and career assessments, 525
 - minimum competency exam (MCE), 525, 526
- High school experience
 - advanced placement access
 - college admissions exams and outcomes
 - exit exams and racial achievement gap
- Hispanic-serving institutions (HSIs), 597
- HSIs. *See* Hispanic-serving institutions (HSIs)

I

If-Then production, 379, 384, 385

Improvement, student engagement

- cycle, 76
- data-informed initiatives, 73–74

- data use and educational, 83–84
- evidence-based, 47, 79
- institution, MSIs, 78
- research-informed, 85
- undergraduate education, 62

Indiana

- description, 12–13
- professional meetings, 14
- summer credit-bearing workshops, 13
- teaching assignments, 13
- university program, 23–24

Institutional improvement, IU, 19–20

Institutional quality, student engagement

- Brigham young university (BYU), 74–75
- Kalamazoo college, 74
- phases, cyclical model, 76
- recommendations, 76
- State University of New York at Potsdam (SUNY Potsdam), 75

Institutional rational choice (IRC), 648–649

Institutional stratification, 448–449

Instrumental variables

- Algebra II, academic outcomes, 265
- counterfactual
 - Algebra II, 277
 - description, 276
 - missing data problem, 278
 - potential outcome, 277
- data
 - ELS:02, 282
 - endogenous independent variable, 283
 - exogenous independent variables, 283–284
 - PETS, 282
- education stakeholders, 266
- endogeneity and exogeneity
 - betas, 279
 - specific course selection, 278
 - upward bias, 279
- high school course
 - postsecondary educational attainment, 270–274
 - taking effects, 269–270
- individual choices
 - economic research, 268
 - educational and parent aspirations, 268
 - math courses, 268
 - students’ course taking, 268–269
- instrument, 280–281
- IV framework, 281–282
- IV models
 - endogeneity testing, 284, 286
 - five-assumption approach, 287–291
 - two-assumption approach, 286–287

- math courses, 264
- MMC, 263
- racial/ethnic groups and social classes, 266
- structural forces, 266, 267
- Integration, community college students
 - academic
 - defined, 468–469
 - determinations, 472–474
 - environment, perceptions, 470–471
 - interactions, perceptions, 469
 - perceptions, academic self, 471–472
 - perceptions of actors, 470
 - social (*see* Social integration)
 - student behaviors, 468
- Involvement, community college students
 - academic, 485–486
 - barriers, 487–488
 - community college transfer students, 485
 - defined, 482
 - L-TSQ, 483–484
 - NSSE, 484
 - quality of effort, 487
 - social, 486–487
- Iowa, doctoral study
 - career goal, 8
 - dissertation, 9, 10
 - “dust-bowl empiricism”, 9
 - OPI, 9–10
- IRC. *See* Institutional rational choice (IRC)
- K**
- Knowledge creation, 157, 163, 170, 204
- Kuh, George. D.
 - appreciation, IU, 12–14
 - center for postsecondary research, 31–33
 - chance encounters, graduate study, 6
 - CSEQ (*see* College student experience questionnaire (CSEQ))
 - description, 1–2
 - faculty career, 11–12
 - higher education
 - business, 4–6
 - program orientation and culture, 15–17
 - high school, 2–3
 - imposter syndrome, 42
 - institutional improvement, 19–20
 - intellectual and scholarly interests
 - ACPA and NASPA, 20–21
 - ASHE, 22
 - CES, 22, 23
 - SLI, 21
 - interpersonal relations and group
 - dynamics, 41–42
 - Iowa, 8–10
 - “maze bright” ability, 41
 - midwest meeting, graduate students, 14–15
 - NSSE (*see* National Survey of Student Engagement (NSSE))
 - profession, educational practices, 40
 - St. Cloud State college, 6–7
 - student success, 33–35
 - undergraduate days, 3–4
- L**
- Laanan’s transfer students’ questionnaire (L-TSQ), 483–484
- Labor market, 549–551
- LASSI. *See* Learning and study strategies inventory (LASSI)
- Latinas/os, 102, 127, 128
- Learning and study strategies inventory (LASSI), 382, 391, 392, 394
- Learning strategies, postsecondary education. *See also* Self-regulated learning (SRL)
 - attributes, 378
 - features, 378
 - metacognitive activity, 379
 - and study tactics, impediments, 396–398
- Legislative professionalism, 658–659
- Limited information maximum likelihood (LIML), 299
- Linear probability model (LPM), 301
- Local average treatment effect (LATE)
 - approach, 288
- Low-income students
 - advanced mathematics classes, 523
 - African Americans and Latinos, 516
 - college access and completion, 514
 - community colleges, 533
 - constrained personal and familial financial resources, 124
 - developmental classes, 116
 - federal and institutional level sectors, 532
 - graduation rates, 127
 - high school, 525
 - institutional enrollment disparities, 123
 - need-based aid, 131
 - “no loan” policies, 540
 - Perry Preschool intervention, 518–519
 - and racial minorities, 516
 - selective institutions access, 540–541
 - and underrepresented, 532
- L-TSQ. *See* Laanan’s Transfer Students’ Questionnaire (L-TSQ)
- Luther college, 3–5, 10, 41

M

- Market boundaries, 363, 366
- Markets, higher education
 - antitrust hearings and legal proceedings, 325
 - associate's/bachelor's degree, 348
 - bundling, services, 354–356
 - colleges and universities, United States, 348, 349
 - “commercialization” and “academic capitalism”, 324
 - complications, suppliers number determination, 350
 - decentralized management models, 324
 - degree level
 - barriers, entry, 361
 - bundling, services, 359–360
 - characteristics, US markets, 356, 357
 - focus and breadth, 359
 - geographic span, 358–359
 - homogeneity, service, 360–361
 - structures, 362
 - students characteristics, 361
 - doctor-and master-degree-granting institutions, 346–347
 - economic concept
 - characteristics, 336–337
 - industry vs. market, 337–338
 - product differentiation, 341–343
 - structures, 338–341
 - grants and state appropriations, 345
 - human capital, 347–348
 - identification, students, 348, 349
 - innovation, definition, 347
 - issues, identification, 363–369
 - literature review
 - academic discussions, 329
 - competition, 333–335
 - deregulation, industries, 331–332
 - industries, 332–333
 - “massification of higher education”, 328
 - Massy's model, 330
 - “McDonaldization of higher education”, 330
 - “quasi-markets”, 330
 - selective institutions, 329
 - market-based policies, 325
 - MIT, 326–327
 - multidimensionality, 345
 - nations, 323
 - policy analysis, 369–370
 - postsecondary institutions, 344, 347
 - postsecondary providers, 325
 - pricing (*see* Pricing, higher education markets)
 - public institutions, 344, 350
 - public policymakers, 327
 - “sandstone” universities, 352
 - student groupings, 346
 - suppliers characteristics, US higher education industry, 350, 351
- Math achievement, middle school experiences, 522–524
- Measures
 - higher education expenditures data sources comparison, 632
 - correlation, 633
 - “State Effort” measure, 622, 624, 634, 639
 - state spending, 645
 - state support, higher education
 - description, 633–634
 - FTE student, 641–642
 - funding per capita, 636–637
 - funding, personal income, 637–639
 - natural log, state funding, 635–636
 - postsecondary education, 642–644
 - spending, total state spending, 639–641
 - variables, 634
- Median voter theorem, 645–647
- Mentoring
 - and advising, 568
 - African American students, 586
 - Black students, 595
 - business context, 572
 - categories, 568
 - decreased ethical reasoning, 241
 - graduate education, 586
 - knowledge transmission, 576
 - Kram's theory of mentoring functions, 568
 - minority student-faculty, 564
 - negative experiences, 588
 - positive effect, 251
 - principles of homophily, 569
 - professional success, 251
 - relationships to misbehavior, 241
 - socializing young researchers, 250
- Middle school experience, math achievement
 - advanced math courses, 522
 - advanced mathematics courses, 523
 - college access and completion behavior, 523–524
 - gains, algebra, 522
 - National Educational Longitudinal Study, 1988, 523
 - “on track”, students, 524

- Minorities. *See also* Transition to college, minority students
 AP courses, 527
 college enrollment, 540, 543
 drop out, high school, 516
 faculty
 advising, 590
 service demands, 570
 students of color, 590
 high-stakes tests, 526
 vs. nonminority, 596
 professors, 590, 592
 student-faculty mentoring relationship, 564
 students
 academic performance, 580
 barriers, 585
 poor-performing, 580
 unequal college access, 534
 Minority-serving institutions (MSIs)
 evidence-based improvement, 79
 student engagement, 78–79
 Misconduct cases
 NSF and HHS, 234
 public criticism, 247
 research
 chemistry, 231
 gastroenterology, 231–232
 heart research experiments, 229–230
 nanotechnology, 230
 oral cancer, 231
 social psychology, 232
 stem-cell, 230
 transplantation immunology, 229
 Motivated strategies for learning questionnaire (MSLQ)
 critical thinking, 394
 defined, 382
 Mount Holyoke model, 417
 MSLQ. *See* Motivated strategies for learning questionnaire (MSLQ)
- N**
 NASBO annual State Expenditure Reports.
 See National Association of State Budget Officers' (NASBO) annual State Expenditure Reports
 NASPA. *See* National Association of Student Personnel Administrators (NASPA)
 National Association of State Budget Officers' (NASBO) annual State Expenditure Reports
 benefits, 621
 description, 615
 drawbacks, 621–622
 expenditure
 data categories, 620
 higher education, 621
 fund revenue sources, 617
 state support, higher education, 617
 National Association of Student Personnel Administrators (NASPA), 20, 21
 National Center for Education Statistics (NCES)
 benefits, 630
 datasets, 282
 degree attainment, 275
 The Delta Cost Project, 629
 drawbacks, 630
 expenditure, higher education, 630
 institutional revenue, 628
 standardized high school mathematics exam, 283
 students of color, 94
 National Center for Higher Education Management Systems (NCHEMS), 24, 547
 National Institute for Learning Outcomes Assessment (NILOA), 37–39
 National Institutes of Health (NIH)
 funded scientists, 234, 239, 241
 grantees, 248
 interim policies, 223
 misconduct definition, 225
 misconduct office, 223
 ORI/NIH program, 227–228
 RCR instruction mandate, 247
 research activities, 229
 Training Grant Requirement, 226
 National Science Foundation (NSF)
 fabrication, falsification, and plagiarism (FFP), 225
 misconduct
 cases, 234
 research, 223
 RCR Training Grant Requirement, 226
 National Survey of Student Engagement (NSSE)
 approaches, learning scale, 61
 BCSSE, 61
 board-dictated policy, 26–27
 CCSSE
 benchmarks, educational practice, 58, 60
 validation studies, 66
 college student behavior, 484
 contributions, literature, 30–31
 CSEQ, Indiana, 23–24

National Survey of Student Engagement (NSSE) (*cont.*)

- CSR, 24
 - CTD, 65
 - departure, 31
 - face validity, 63–64
 - higher education researchers, 484
 - institute, educational practice, 28–29
 - media relations, 27–28
 - NCHEMS, 24
 - objections, assertions, 62
 - occasional migraine, 29–30
 - post-NSSE years
 - international work, 39–40
 - NILOA, 37–39
 - SNAAP and alumni surveys, 35–37
 - prosper, 25
 - quality of effort paradigm, 63
 - response process, characterization, 62
 - students' employment, 129
 - WNSLAE, 64–65
- Native Americans
- staff, 129
 - students, 95, 103, 123, 127, 129
- NCES. *See* National Center for Education Statistics (NCES)
- NCHEMS. *See* National Center for Higher Education Management Systems (NCHEMS)
- Newman-Girvan algorithm, 187
- NIH. *See* National Institutes of Health (NIH)
- NILOA. *See* National Institute for Learning Outcomes Assessment (NILOA)
- Nonzero average causal effect, 298–299
- Nonzero partial correlation, endogenous variable, 287
- Normal schools
- analysis, 417, 423
 - contribution, 408
 - defined, 409
 - “evolution”, 416
 - historians, 410–411
 - New York's Oswego state, 413
 - nineteenth-century, 416, 419
 - post-civil war, 414
 - principals, 410, 416
 - and teachers colleges, 433
 - transition, 421–422, 431
 - Westfield state, 413
- Norms of science, 239, 241
- NSSE. *See* National Survey of Student Engagement (NSSE)

O

- Office of Research Integrity (ORI)
- annual reports, 224
 - CITI, 226
 - integrity, research, 227
 - ORI/NIH program, 228
 - programs and collaborations, 226
- Ordinary least squares (OLS) model, 659–660
- Organizational climate, 240
- Organizational injustice, 240–241
- Organizational justice, 240
- Organizational theory, 21, 679
- ORI. *See* Office of Research Integrity (ORI)

P

- Pedagogy
- courses, 434
 - and directors of education, 428
 - education, universities, 419
 - nineteenth century, 405
 - training, 412
 - undergraduate training, 438
 - universities, departments/professorships, 411
- Performance
- academic, 465–466
 - market, 369
- PETS. *See* Postsecondary Education Transcript Study (PETS)
- Policy analysis
- higher education policies, 369
 - markets, definition, 369
 - postsecondary education, 370
 - resource allocation, 369
- Politics
- interest group, 655–657
 - OLS model, 659–660
 - state funding, higher education, 652
- “Positive restlessness”, 78
- Postsecondary completion
- advanced placement (AP) courses, 271–272
 - datasets, course taking effects, 272
 - high school curriculum
 - effect, 274
 - policies, 272
 - HSB survey data, 271
 - NELS:88, 271
 - PSM, 273–274
 - urbanicity, 273
- Postsecondary education
- aptitude, 395
 - classification, interventions, 389

- “compact notes”, 399, 400
 - complex regression model, 393
 - 4-component model, 392
 - description, 377–378
 - GPA, 391–392
 - learners self-reports, 394–395
 - learning strategies (*see* Learning strategies, postsecondary education)
 - merit noting, 389
 - meta-analysis, 392–393
 - MSLQ and LASSI, 393–394
 - SRL (*see* Self-regulated learning (SRL))
 - study skills (*see* Study skills, postsecondary education)
 - Postsecondary Education Transcript Study (PETS), 282
 - Precollege predictors
 - childhood/early education programs, 518
 - class size reduction and college completion, 521–522
 - preschool and college completion, 518–520
 - Predominantly White institutions (PWIs)
 - negative racial climate, 97
 - “socialization” paradigms, 99
 - Pricing, higher education markets
 - associate level institutions, 354
 - Bachelor’s degree, 354
 - characteristics, US markets, 352, 353
 - Principal-agent theory, 651–652
 - Privilege institutions
 - college access, sector, 532–533
 - intervention
 - affirmative action, 539–541
 - percent plan, 541–542
 - state bans, affirmative action, 542–543
 - Process indicators
 - defined, 48
 - and national education goals, 48–49
 - Professionalization
 - education schools, 427
 - “emergence”, 414
 - projects, 407, 420
 - teacher education, 415–416, 422
 - Propensity score matching (PSM), 273–274
 - PSM. *See* Propensity score matching (PSM)
 - Public policy and higher education attainment
 - “access” institutions, 533–538
 - college access, sector, 532–533
 - data, demography and policy analysis, 543–548
 - demography, educational attainment, 515–518
 - diverse nonselective four-year sector, 550–551
 - high school experiences, 525–532
 - labor market, 549–550
 - middle school experiences, 522–524
 - P-16 pipeline framework, 515
 - precollege predictors
 - class size reduction and college completion, 521–522
 - preschool and college completion, 518–520
 - privilege institutions, 538–543
 - PWIs. *See* Predominantly White institutions (PWIs)
- Q**
- Quasi-experimental methods, 265, 273
- R**
- Race and higher education
 - California, 540
 - college admissions and stratification outcomes, 530–532
 - color-blind approach, 539
 - Racial homophily, 178, 179
 - Racial identity, 102
 - Rational choice theory
 - coin of the realm, 237
 - costs of honesty, 238
 - rewards of cheating, 237–238
 - RCR. *See* Responsible conduct of research (RCR)
 - Receptivity. *See* Transfer receptivity
 - “Relative density” indicator, 656
 - Research integrity
 - description, 217, 218
 - promotion
 - codes of conduct, 245–247
 - mentoring, 250–251
 - normative pressure, 244–245
 - regulation, 244
 - training, 247–250
 - questionable research practices, 220
 - regulatory oversight emergence
 - congressional interest, 222
 - definitions, 224–225
 - offices and procedures, 223–224
 - organizations, 224
 - ORI/NIH program, 227–228
 - training, conduct of research, 225–227
 - self-regulation, 220–222
 - Singapore Statement*, 218
 - standards, 219

- Research misconduct
 - cases (*see* Misconduct cases)
 - codes of conduct, 220
 - consequences, 241–243
 - definition, 219–220
 - deter
 - codes of conduct, 245–247
 - mentoring, 250–251
 - normative pressure, 244–245
 - regulation, 244
 - training, 247–250
 - prevalence, 232–235
 - rational choice theories
 - costs of honesty, 238
 - rewards of cheating, 237–238
 - social context theories
 - mentoring, 241
 - organizational climate, 240
 - organizational injustice, 240–241
 - trait theories, 236
- Responsible conduct of research (RCR)
 - catalog, 248–249
 - CITI, 249–250
 - education, ethical behaviors
 - and decision-making, 249
 - instructional programs, 248
 - instructors, 226
 - online instruction, 250
 - training, 226, 249
 - Training Grant Requirement, 226
- S**
- SACQ. *See* Student adaptation to college questionnaire (SACQ)
- Self-regulated learning (SRL)
 - COPES, 381
 - learning strategies and study skills, 378–379
 - and study tactics and learning strategies
 - control, 386
 - reliability, 386–387
 - self-report questionnaires, 382–383
 - self-report responses, 385
 - study skills, 387–389
 - think aloud protocols, 384
 - traces, 384–385
 - Winne and Hadwin's model, 379–381
- Self-regulation
 - components, 221–222
 - description, 220
 - scientific integrity, 220
- Self-reports
 - instruments, 391
 - measures, 393–395
 - questionnaires, 382–384
 - responses, 385
- Sense of belonging, 110, 133
- SHEF data. *See* State Higher Education Finance (SHEF) data
- Shock
 - culture, 476
 - transfer, 465–466
- SLT. *See* Social learning theory (SLT)
- SNA. *See* Social network analysis (SNA)
- Social capital, 110, 111, 126
- Social context theory
 - description, 238–239
 - mentoring, 241
 - organizational
 - climate, 240
 - injustice, 240–241
 - social norms, 239
 - unethical and dishonest behavior, 239
- Social exchange frameworks, student-faculty interaction, 571–572
- Social integration
 - and academic, 481
 - barriers, 479–480
 - Laanan's concept, social adjustment, 476
 - measurements, 477–478
 - research, student demographic characteristics, 479
 - students' degree, 475
 - Tinto's models, 475–476
 - transfer students, 480
- Socialization models. *See* Tinto and socialization models, student transition process
- Social learning theory (SLT), 575–577
- Social network analysis (SNA)
 - categories, 156, 157
 - co-citation network (*see* Co-citation)
 - collaborative and friendship ties, 185
 - description, 151
 - edges/ties, 155
 - higher education
 - articles, popular journals, 153, 154
 - literature search, 153
 - publications per year, 153, 154
 - relations, actors, 152–153
 - student and faculty networks, 152
 - network population, 155
 - nodes/vertices, 155
 - primary social actors, 156
 - text's research question, 156
 - universities (*see* University)
- Social networks. *See* Social network analysis (SNA)

- Social psychology journals, 192
- SRL. *See* Self-regulated learning (SRL)
- Stable unit treatment value assumption (SUTVA), 288, 294
- Stata syntax, 313–317
- State appropriations
 - categories, 616–617
 - description, 616
 - The *Digest*, 629
 - general fund and expenditure, 631, 633
 - higher education appropriations
 - per FTE, 641
 - NCES, 633
 - stimulus funds, 629–630
 - tax fund appropriations, 638
 - tax, Grapevine data, 623, 624
- State colleges
 - Colorado, 432
 - former normal schools, 448
 - multipurpose, 432
 - regional, 449, 450
 - San Francisco, 432
- State finance
 - higher education, 655, 659
 - IRC forces, 649
- State Higher Education Finance (SHEF) data
 - characteristics, 618–619
 - correlation, 633
 - description, 615
 - SHEEO-SHEF
 - benefits, 625
 - data categories, 624
 - drawbacks, 625
 - state support, 625
- State policy
 - fiscal policy
 - framework, 649, 650
 - individual variables, 650–651
 - interest groups, 655–657
 - legislative links, K-12 and higher education, 514
 - national longitudinal datasets, 544
 - “new institutionalism”, 648
 - policymakers, 640
 - priorities, definition, 645
- State support, higher education
 - funding data
 - categories, appropriations and expenditures, 616–617
 - Census data, 626–628
 - data comparisons, 630–633
 - Grapevine report, 622–624
 - NASBO, 617, 620–622
 - NCES, 628–630
 - SHEEO-SHEF, 624–625
 - sources, 615–616
 - governance structures, 657–658
 - independent variables, 654–655
 - interest groups, 655–657
 - IRC, 648–649
 - legislative professionalism, 658–659
 - measures, 633–635
 - median voter theorem, 645–647
 - methodological advances, 659–660
 - “new institutionalism”, 647–648
 - previous appropriation levels, 653
 - principal-agent theory, 651–652
 - state fiscal policy framework, 649–651
 - state funding
 - funding per \$1,000, personal income, 637–639
 - natural log, 635–636
 - per capita, 636–637
 - per FTE student, 641–642
 - total state spending, 639–640
 - unifying measure, postsecondary education, 642–644
- Student adaptation to college questionnaire (SACQ)
 - gender differences, 109
 - transitions minority and female students, 108
 - uses, measurement tool, 107
- Student affairs administration, 20
- Student engagement
 - activities and experiences, college outcomes, 51
 - changes, colleges and universities, 72
 - community colleges, 68–69
 - data use and educational improvement, 83–84
 - defined, 47–48
 - desired college outcomes, 30
 - developments, 54–56
 - differentiation and granularity, 82–83
 - distance learners, 72
 - instrument, 24–25
 - integration, 52–53
 - involvement, 52
 - law school student engagement tool, 32
 - learning activities, 71
 - learning and cognitive development, 53–54
 - measurement
 - CCSSE and NSSE, 58, 60–64
 - NSSE, learning scale, 61
 - survey research, 57–59
 - models development, effective practice, 77–78

- Student engagement (*cont.*)
- MSIs, 78–79
 - national discourse, college quality, 49–50
 - national education goals and “process indicators”, 48–49
 - NSSE and CCSSE measures, 64–66
 - and outcomes, 66–67
 - preparation, class, 71
 - “quality of effort”, 51–52
 - research initiatives, higher education organizations
 - CIC projects, 80
 - CILA, Wabash college projects, 80–81
 - research, practice
 - assessment, college environment, 72
 - institutional quality, 73–77
 - share, departments, 71
 - “social engagement”, 84
 - teaching and learning, 54
 - trends, institution-level measures, 69–70
 - typological research, 68
 - WNSLAE, 64
 - women’s colleges, 71
- Student-faculty interaction
- communities of color
 - Black male faculty, 570
 - homophilous relationships, 569
 - White faculty, 570
 - White institutions, 570
 - forms, 566–568
 - research, faculty
 - frequency, interaction, 590–591
 - outcomes, 591–596
 - service, 589
 - research, students
 - graduate and professional students, 585–589
 - undergraduate students (*see* Undergraduate students)
 - SLT (*see* Social learning theory (SLT))
 - social exchange frameworks (*see* Social exchange frameworks, student-faculty interaction)
 - socialization, 573–575
 - trends, research
 - accessibility cues, 566
 - Astin’s involvement theory, 564
 - Black student, 564
 - college retention theories, 563
 - criticism and support, 565–566
 - educational gains, 565
 - empirical studies, 562
 - faculty roles, 562–563
 - PWIs, 564
 - undergraduate students (*see* Undergraduate students)
- Student learning imperative (SLI), 21
- Student outcomes
- faculty interaction, 577, 578
 - graduate and professional students, 587
 - socialization, positive influence, 573
- Students. *See also* Student-faculty interaction; Students of color
- African-American women, 443
 - attitudes on race, 152
 - Catholic students, 444
 - poor students, 445
 - publications, 195
 - racial and ethnic groups, 443
 - Seven Sisters, 441
 - student-centered articles, 193, 194
 - teacher-education programs and institutions, 446
 - ties, 155
 - undergraduate, 446
 - universities, education sites
 - country, 176–177
 - dependent variable networks, 177–180
 - independent variable networks, 180–183
 - individual, 175–176
 - women students, 440, 442
- Students of color
- accessibility cues, 585
 - American professors, 571
 - biomedical and behavioral sciences, 582
 - educational success, 579
 - faculty productivity, 593
 - homophilous relationships, 569
 - mentoring, 569
 - mentorship, 586
 - minority student persistence, 575
 - racism, 580
 - relationships with professors, 570
 - Tinto’s model, 596
 - undergraduate, 569
 - White faculty, 570
 - wise schooling, 579
- Student success
- CILA, 34
 - DEEP research, 33–34
- Study skills, postsecondary education
- books, 387–389
 - individual, 379
 - SQ3R method, 396

- Survey research, student engagement
 - design, NSSE and CCSSE surveys, 57, 58
 - measurement, 56
 - representative NSSE questions, 58, 59
- SUTVA. *See* Stable unit treatment value assumption (SUTVA)

T

- Task understanding, 397
- Teacher characteristics, 407
- Teacher education
 - amid disfavor, 1940s–2000
 - gender ramifications, 433
 - inferior intellectual quality, 434
 - M.A.T. programs, 437
 - teacher training institutions, 431
 - traditional university-based, 438
 - training programs, 436
 - beginnings, 1820s–1880s
 - African-American teachers, 418
 - class and gender inequalities, 415
 - development of method, 413
 - education leadership, 410
 - Hampton-Tuskegee approach, 419
 - mental and moral philosophy, 412
 - normal schools, 409–410
 - “object teaching”, 413
 - pedagogical training, 412
 - “professionalization projects”, 414
 - schoolmasters, 408
 - status consciousness, 419
 - teacher training, 409
 - teaching’s legacy, low status, 416
 - women’s academies and seminaries, 417
 - defined, 405–406
 - and historiography, higher education
 - sites, 447–451
 - students (*see* Students)
 - public-school system, 407
 - transitions, 1890s–1930s
 - accreditation and curricular expansion, 422
 - educational researchers, 427, 428
 - education, universities, 429
 - elite group, 426–427
 - “feminization”, 426
 - gender concerns, 423
 - Jewish teachers, 424
 - normal schools to teacher’s college, 421
 - philanthropy, 429
 - secondary teachers, 425
 - synthesis, diffuse literature, 420
 - university of Illinois, 428
- Teachers colleges
 - American Association, 421, 432, 439–440
 - development, 410
 - single-purpose, 432
 - transition, normal schools, 420–422, 430–431
- Teaching and learning
 - college quality, 81–82
 - effective, 54
 - enhancement, undergraduate, 74
 - higher education, 85
 - research, colleges and universities, 54
 - research, cooperative and problem-based learning, 55
 - scholarship, 56
 - and student success, 77, 81
- Texas’ Top Ten Percent Plan, 541
- Think aloud protocols, 384, 385
- Tinto and socialization models, student transition process
 - adaptation, Van Gennep, 99–100
 - defined, 99
 - integration, “rites of passage” and acculturation, 100–103
 - strengths and limitations, 103
- Tinto’s model, 466, 468, 469, 475, 476
- Trace data, 384–385, 395, 400
- Training
 - description, 247
 - faculty, 244
 - RCR, 248–250
 - research ethics, 243
 - responsible conduct of research, 225–227
- Trait theory, 236
- Transfer receptivity
 - defined, 496–497
 - institutional, 499
 - measurements, 497–498
 - stigmatization, 498–499
- Transition to college, minority students
 - academic preparation, 97
 - ACF, 109–111
 - cognitive and social/emotional aspects, 109
 - early academic experiences, psychological approaches, 120–122
 - enrollment patterns, 135–136
 - and finances
 - aid, 124–127, 131
 - economic models, 132
 - employment, 129–130
 - familial financial support, 127–128
 - low-income students of color, 123–124
 - stress, 123

- Transition to college, minority student (*cont.*)
- financial barriers, 96
 - first-year programs and interventions, 131–134
 - negative racial climate, PWIs, 97
 - positive acclimation, campus, 97
 - precollege academic preparation
 - family influences, 114
 - within-school inequalities, 114–116
 - proportion, baccalaureate aspirants, 94
 - psychological perspectives
 - SACQ (*see* Student Adaptation to College Questionnaire (SACQ))
 - transition theory, 105–106
 - racial/ethnic groups, 94, 95, 135
 - remediation and developmental classes, 116–118
 - research-based investigations, 95
 - socialization and integration, students of color, 98–99
 - sociological approaches, early academic experiences
 - “acting White” phenomenon, 119–120
 - community colleges, 118
 - first-generation students, 118
 - living-learning programs, 119
 - stress students, 134
 - theory of validation, 111–113
 - Tinto and socialization models, 99–103
 - traditional-aged college students, 93
 - Weidman’s theory, socialization, 104
- Tuition
- changes, rate, 363
 - earnings, 326
 - funding, institutions, 346
 - liberal arts colleges, 342
 - MIT and Ivy League institutions, price fixing, 326
 - posted, 342, 354
- Two-stage least squares (2SLS), 301–302

U

- Undergraduate students
- academic success
 - academic integration, 584
 - American students, 585
 - barriers, 585
 - functional interactions, 584
 - informal interactions, 584
 - Latino students, 585
 - positive associations, 583

- conditional effects
 - academic year, 582
 - gender, 581
 - generation status, 583
 - institutional type and size, 582–583
 - race, 580–581
- predictors, student-faculty interactions
 - accessibility cues, 579
 - communication, 579
 - outside classroom, 578
 - “wise schooling”, 579
- Tinto’s theory of integration, 577
- Under-represented students, 406, 440, 446, 447, 451
- University
 - description, 151
 - faculty work sites
 - computing power and statistical methods, 174–175
 - independent variable, networks, 167–173
 - individual, 157–160
 - knowledge production, 156
 - network scholars, 173
 - networks, dependent variable, 163–167
 - organization/discipline, 162–163
 - paper, team/research group, 160–162
 - student education sites
 - country, 176–177
 - dependent variable networks, 177–180
 - independent variable networks, 180–183
 - individual, 175–176
 - scholarship, 183
 - student, faculty and staff interaction, 184
- Utilization deficiency, 397

W

- Wabash National Study of Liberal Arts Education (WNSLAE)
- cognition, 67
 - defined, 64
 - moral reasoning, 67
- Weidman’s theory, student socialization, 104
- Winne-Hadwin model, 380
- WNSLAE. *See* Wabash National Study of Liberal Arts Education (WNSLAE)
- Women’s higher education, 425, 441, 443, 444

VOLUME XXII

- A Career Out of Control (Maybe)** James L. Bess, *New York University*
- Accountability, Assessment, and the Scholarship of “Best Practice”** Alicia C. Dowd, *University of Southern California* and Vincent P. Tong *Gateway Community College*
- Striving for what? Exploring the Pursuit of Prestige** KerryAnn O’Meara, *University of Massachusetts Amherst*
- ‘Outsiders’, Student Subcultures, and the Massification of Higher Education** Richard Flacks, *University of California* and Scott L. Thomas, *University of Georgia*
- Teachers’ Nonverbal Behavior and its Effects on Students** Elisha Babad, *Hebrew University of Jerusalem*
- The Pell Program at Thirty Years** Bradley R. Curs, *University of Missouri-Columbia*, Larry D. Singell, Jr., *University of Oregon*, and Glen R. Waddell, *University of Oregon*
- The Political Economy of Redistribution Through Higher Education Subsidies** William R. Doyle, *Peabody College of Vanderbilt University*
- Adjusting for Nonresponse in Surveys** Gary R. Pike, *Indiana University Purdue University Indianapolis*
- Neoliberal Policies and Community College Faculty Work** John S. Levin, *University of California, Riverside*
- Signals and Strategies in Hiring Faculty of Color** Franklin A. Tuitt, *University of Denver*, Mary Ann Danowitz Sagaria, *University of Denver*, and Caroline Sotello Viernes Turner, *Arizona State University*
- Marketing Sameness: Consumerism, Commercialism, and the Status Quo** Deron R. Boyles, *Georgia State University*
- Author and Subject Indexes**
- 2007: 611 pages ISBN: 1-4020-5665-9

VOLUME XXIII

- Economic Models and Policy Analysis in Higher Education: A Diagrammatic Exposition** Michael B. Paulsen, *University of Iowa*, and Robert K. Toutkoushian, *Indiana University*
- Rankings and Classifications in Higher Education: A European Perspective** Marijk van der Wende, *University of Twente and Vrije Universiteit Amsterdam*
- Institutional Transformation and the Advancement of Women Faculty: The Case of Academic Science and Engineering** Mary Frank Fox, *Georgia Institute of Technology*
- The State, the Market and the Institutional Estate: Revisiting Contemporary Authority Relations in Higher Education** Brian Pusser, *University of Virginia*
- Interests, Information, and Incentives in Higher Education: Principal-Agent Theory and Its Potential Applications to the Study of Higher Education**

Governance Jason E. Lane, *University of Albany*, and Jussi A. Kivisto, *University of Tampere*

Toward a Theory of Faculty Professional Choices in Teaching That Foster College Student Success John M. Braxton, *Vanderbilt University*

Financial Aid and Student Dropout in Higher Education: A Heterogeneous Research Approach Rong Chen, *Seton Hall University*

Theorizing Research Policy: A Framework for Higher Education Amy Scott Metcalfe, *University of British Columbia*

Studying the Effectiveness of Programs and Initiatives in Higher Education Using the Regression-Discontinuity Design Sally A. Lesik, *Central Connecticut State University*

From Creation to Cultural Resistance and Expansion: Research on American Indian Higher Education Roger Geertz González, *Florida International University*

Using Holland's Theory to Study Patterns of College Student Success: The Impact of Major Fields on Students Kenneth A. Feldman, *Stony Brook University*, John C. Smart, *University of Memphis*, and Corinna A. Ethington, *University of Memphis*

Author and Subject Indexes

2008: 393 pages ISBN: 978-1-4020-6958-1

VOLUME XXIV

Why Financial Aid Matters (or Does Not) for College Success: Toward a New Interdisciplinary Perspective Sara Goldrick-Rab, *University of Wisconsin-Madison*, Douglas N. Harris, *University of Wisconsin-Madison*, and Philip A. Trostel, *University of Maine and University of Wisconsin-Madison*

The Use of Matching Methods in Higher Education Research: Answering Whether Attendance at a 2-Year Institution Results in Differences in Educational Attainment C. Lockwood Reynolds, *Kent State University*, and Stephen L. DesJardins, *University of Michigan*

Othering Research, Researching the Other: De/Colonizing Approaches to Qualitative Inquiry Kakali Bhattacharya, *Texas A & M University Corpus Christi*

The Cultural Capital of Cultural and Social Capital: An Economy of Translations Glenda Musoba, *Florida International University*, and Benjamin Baez, *Florida International University*

The Rise and Fall of Need-Based Grants: A Critical Review of Presidential Discourses on Higher Education, 1964–1984 Julie Renee Posselt, *University of Michigan*

A Review of Attributional Retraining Treatments: Fostering Engagement and Persistence in Vulnerable College Students Tara L. Haynes, *University of Manitoba*, Raymond P. Perry, *University of Manitoba*, Robert H. Stupnisky, *University of Manitoba*, and Lia M. Daniels, *University of Alberta*

Globalization, Social Movements, and the American University: Implications for Research and Practice Robert A. Rhoads, *UCLA*, and Amy Liu, *UCLA*

Hispanics and Higher Education: An Overview of Research, Theory, and Practice Amaury Nora, *University of Houston's College of Education*, and Gloria Crisp, *University of Texas at San Antonio*

Turning from Time to Space: Conceptualizing Faculty Work Aaron M. Kuntz, *University of Alabama*

Student Aid and Its Role in Encouraging Persistence Don Hossler, *Indiana University*, Mary Ziskin, *Indiana University*, Jacob P.K. Gross, *Indiana University*, Sooyeon Kim, *University of Michigan*, and Osman Cekic, *Indiana University*

Enter the Dragon? China's Higher Education Returns to the World Community: The Case of the Peking University Personnel Reforms Rui Yang, *University of Hong Kong*

Name and Subject Indexes

2009: 475 pages ISBN: 978-1-4020-9627-3

VOLUME XXV

The Role of Information in the Policy Process: Implications for the Examination of Research Utilization in Higher Education Policy Erik C. Ness, *University of Georgia*

From Theory to Action: Exploring the Institutional Conditions for Student Retention Vincent Tinto, *University of Chicago Press*

Reform Efforts in STEM Doctoral Education: Strengthening Preparation for Scholarly Careers Ann E. Austin, *Michigan State University*

Toward a More Complete Understanding of the Role of Financial Aid in Promoting College Enrollment: The Importance of Context Laura W. Perna, *University of Pennsylvania*

The Pursuit of Student Success: The Directions and Challenges Facing Community Colleges Linda Serra Hagedorn, *Iowa State University*

Studying the Impact of Parental Involvement on College Student Development: A Review and Agenda for Research Linda J. Sax, *University of California at Los Angeles* and Katherine Lynk Wartman, *Boston College*

Achievement Emotions in Higher Education Reinhard Pekrun and Elizabeth J. Stephens, *University of Munich*

The Use of Panel Data Models in Higher Education Policy Studies Liang Zhang, *The Pennsylvania State University*

Enlarging Our Understanding of Glass Ceiling Effects with Social Closure Theory in Higher Education Jerlando F.L. Jackson and Raul A. Leon, *University of Wisconsin-Madison*

Cultural Perspectives of Academia: Toward a Model of Cultural Complexity Ryan E. Smerek, *University of Michigan*

Research Libraries in the Twenty-First Century Yvonna S. Lincoln, *Texas A&M University*

An Examination of Faculty Work: Conceptual and Theoretical Frameworks in the Literature Vicki J. Rosser, *University of Nevada* and Lynn N. Tabata, *University of Hawaii*

Herding Cats and Big Dogs: Tensions in the Faculty-Administrator Relationship Marietta Del Favero, *University of New Orleans*, and Nathaniel J. Bray, *The University of Alabama*

Name and Subject Indexes

2010: 567 pages ISBN: 978-90-481-8597-9

VOLUME XXVI

Undergraduate Living-Learning Programs and Student Outcomes Karen Kurotsuchi Inkelas, *University of Virginia* and Matthew Soldner, *University of Maryland's College*

Qualitative Research and Public Policy: The Challenges of Relevance and Trustworthiness William G. Tierney, *University of Southern California* and Randall F. Clemens, *University of Southern California*

Multilevel Analysis in Higher Education Research: A Multidisciplinary Approach John J. Cheslock, *Pennsylvania State University* and Cecilia Rios-Aguilar, *University of Arizona*

The Financial Aid Picture: Realism, Surrealism, or Cubism? Donald E. Heller, *Pennsylvania State University*

Inside the Panopticon: Studying Academic Reward Systems KerryAnn O'Meara, *University of Maryland*

In the National Interest: The College and University in the United States in the Post-World War II Era Philo A. Hutcheson, *Georgia State University* and Ralph D. Kidder, *Marymount University*

Conducting Multi-paradigm Inquiry in the Study of Higher Education Organization and Governance: Transforming Research Perspectives on Colleges and Universities Adrianna Kezar, *University of Southern California* and Jay R. Dee, *University of Massachusetts Boston*

An Exploration of the Scholarly Foundations of Educational Development Gary Poole, *University of British Columbia's Faculty of Medicine* and Isabeau Iqbal, *University of British Columbia*

Examining Pathways to and Through the Community College for Youth and Adults Debra D. Bragg, *University of Illinois*

A Review of the Theories Developed to Describe the Process of College Persistence and Attainment Tatiana Melguizo, *USC Rossier School of Education*

Using Student Development Theories to Explain Student Outcomes Vasti Torres, *Indiana University*

Name and Subject Indexes

2011: 502 pages ISBN: 978-94-007-0701-6

VOLUME XXVII

I Have Always Been a Student: A Tale of Two Careers P.T. Terenzini, *Pennsylvania State University*

A Model for Diverse Learning Environments S. Hurtado, *University of California*, Cynthia L. Alvarez, *University of California*, Chelsea Guillermo-Wann, *University of California*, Marcela Cuellar, *University of California* and Lucy Arellano, *University of California*

Understanding Academic Work in a Changing Institutional Environment L. Leisyte, *University of Twente* and Jay R. Dee, *University of Massachusetts Boston*

The Sociology of Academic Careers: Problems and Prospects J.C. Hermanowicz, *The University of Georgia*

Regression Discontinuity Design: Recent Developments and a Guide to Practice for Researchers in Higher Education B.P. McCall, *University of Michigan* and Rob M. Bielby, *University of Michigan*

Toward a Greater Understanding of the Effects of State Merit Aid Programs: Examining Existing Evidence and Exploring Future Research Direction Shouping Hu, *Florida State University*, Matthew Trengove, *Florida State University* and L. Zhang, *Pennsylvania State University*

Access and Success for Students from Indigenous Populations S.L. Thomas, *Claremont Graduate University*, Shawn Malia Kana'iaupuni, *Kamehameha Schools*, Brandi Jean Nālani Balutski, *University of Hawai'i at Mānoa* and Antoinette Konia Freitas, *University of Hawai'i at Mānoa*

The Roles of International Organizations (IOs) in Globalizing Higher Education Policy R.A. Shahjahan, *Michigan State University*

Southern Higher Education History: A Synthesis and New Directions for Research A.W. Dolan, *University of Mississippi* and John R. Thelin, *University of Kentucky*

Rural Community Colleges S.G. Katsinas, *The University of Alabama* and David E. Hardy, *The University of Alabama*

What Do We Mean by Privatization in Higher Education? A. Hicklin Fryar, *University of Oklahoma*

2012: 564 pages ISBN: 978-94-007-2949-0